

The Foraminifera of Lord Howe Island, South Pacific.

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(PLATES 35-37.)

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THE highly interesting material which forms the subject of the present Monograph was collected by Prof. R. Douglas Laurie during the visit of the British Association to Australia in 1914. We may quote his own description, which is as follows:—"It consists of material taken from between tide-mark at 'Middle Beach' on the east side of the Island, which is the exposed side, *i. e.* without a coral reef. There is a little coral to be seen growing on this shore at low tide, but on the other—on the west side of the Island—is a coral reef quite well developed and protecting a lagoon, about a mile from the land.

"Middle Beach, observation spot; Lat. $31^{\circ} 31' 30''$ S., Long. $159^{\circ} 15' 28''$ E.

"Lord Howe Island is the most southerly Pacific Island with a coral reef. Norfolk Island, though about $2^{\circ} 30'$ further north, has none, nor is there one on the Australian Pacific coast at similar latitude.

"The whole of the material was collected from one small beach; from two different levels. 58 *b*, hardened coral sand and weed from rock-pools at lower half of the beach; 58 *c*, loose surface coral sand to an approximate depth of $\frac{1}{4}$ inch, from three-quarter high-tide line."

Prof. Laurie sent us a preliminary sample, with a view to ascertaining the value of the material, from 58 *c*, and, this having promised excellent results, he subsequently sent us seven bottles, which may be described as follows:—

- No. 1. In 70% alcohol. This had never been dried. (58 *b*)
 ,, 2 & 3. ,, ,, This had been previously dried at 50° C. These yielded about 10 cc. of "floatings." Much byssus and organic material. Many species in the finer siftings, and notable specimens of *Nubecularia bradyi*, *N. schauinslandi*, and *Discorbina polystomelloides* in the coarser grades.
 ,, 4. A small bottle containing *Orbitolites* only; ranging from minute specimens up to individuals 6 mm. in diameter. Dried without heat. (58 *b*)
 ,, 5. Similar material in 70% alcohol. Never dried. (58 *b*)
 ,, 6. A single dried specimen of *Orbitolites complanata*, with the monstrous rectangular secondary outgrowth. (From 58 *b*)

No. 7. The residue of the preliminary sample from 58*c*, dried without heat. This material was coarse, and yielded practically no "floatings," the Foraminifera being a good deal worn. It consisted largely of *Orbitolites* and *Tinoporus* (*Baculogypsina sphaerulata*) with about twenty other species of robust types, among which *Amphistegina lessonii*, *Textularia agglutinans*, and its ally *Haddonina torresiensis* were prominent.

Perhaps the most notable feature of the gatherings was the presence of two genera new to science, *Diffusilina* and *Craterites*, which are fully described and figured in this monograph.

Another very noteworthy and interesting feature was the profuse occurrence of species in the reproductive stages, both by viviparity and "budding." We have called attention, in our notes, to *Nubecularia lucifuga*, *Spirillina campanula* (sp. nov.), *Discorbina tabernacularis*, *Gypsina inhaerens*, and others, containing young brood in the cavity of the test, resulting from the absorption of the internal septa. Beyond this, certain species (e. g., *Bulimina elegantissima*) exhibited unquestionable evidence of the reproduction by "budding" from the aperture, described at length and illustrated by Heron-Allen in the Phil. Trans. of the Royal Society (H-A. 1915, RPF.).

Among the 199 species and varieties described from the material submitted to us, seven are new to science. Perhaps the most noteworthy species, beyond these, are *Nubecularia schauinslandi*, *Miliolina kerimbatica*, *M. stelligera*, *Fischerina pellucida*, *Iridia diaphana*, *Haddonina torresiensis*, *Fronducularia scottii*, *Uvigerina selseyensis*, *Ramulina grimaldii*, and *Discorbina reniformis*.

We may be allowed to say that we have never had material submitted to us which has been more carefully collected and preserved for examination. Our only regret is that it should have been collected from reefless areas only. No complete study of the foraminiferal fauna of the Island can be made under such reservation. The material shows that a large proportion of the specimens are not of local origin, but are more or less water-worn shells which have travelled some distance. The more perfect specimens, of local origin, are, in the case of a number of species, rather small and pauperate, probably evidencing existence under difficulties, due, no doubt, to paucity of food on the exposed side of the Island. A collection made on the eastern side of the Island, among the reefs and in the still waters of the Lagoon, would probably have yielded a much longer list.

The general facies of the foraminiferal fauna is, of course, sub-tropical and of the Indo-Polynesian type. Many of the species recorded have a wide range, from East Africa, through the Malay and Australasian Seas, to the Pacific. Perhaps the most significant feature is the marked rarity of certain genera which might reasonably have been expected to occur in abundance, e. g., *Hauerina*, *Peneroplis*, *Alveolina*, *Polytrema*, *Operculina*, *Heterostegina*, and so on, and the entire absence of many typical species which we should have expected to find in such latitudes and in such conditions.

Sub-Kingdom **PROTOZOA.**Class **RHIZOPODA.**Order **FORAMINIFERA.**Family **MILIOLIDÆ.**Sub-family **NUBECULARIINÆ.***NUBECULARIA DeFrance.*1. *NUBECULARIA LUCIFUGA DeFrance.* (Pl. 35. fig. 1.)

Nubecularia lucifuga DeFrance, 1825, Dict. Sci. Nat. vol. xxxv. p. 210; Atlas Zooph. pl. 44. fig. 3.

„ „ Brady, 1884, FC. p. 134, pl. 1. figs. 9-16.

„ „ Cushman, 1910, etc., FNP. 1917, p. 41, pl. 8. fig. 6.

Fréquent, but not very typical, displaying a tendency to run into straight lines of chambers. In one specimen the broken final chamber shows what is apparently a young individual fitting closely into the conformation of the chamber. The young specimen consists of four inflated chamberlets arranged on a rotaline plan. The surface appears to be pitted, but not perforate. Texture very thin and delicate.

2. *NUBECULARIA BRADYI Millett.*

Nubecularia inflata Brady, 1884, FC. p. 135, pl. 1. figs. 5-8.

„ *bradyi* (nom. nov.) Millett, 1898, etc., FM. 1898, p. 261, pl. 5. fig. 6.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 550, pl. 40. figs. 8-10.

Abundant and very variable.

3. *NUBECULARIA SCHAUINSLANDI (Rhumbler).* (Pl. 35. figs. 2-5.)

Miliolina schauinslandi Rhumbler, 1906, FLC. p. 41, pl. 3. figs. 20, 21.

Quinqueloculina „ Cushman, 1910, etc., FNP. 1917, p. 56, pl. 8. figs. 7, 8 (after Rhumbler).

Frequent and very variable. The test, so far as external appearances go, starts with a perfectly normal and well-developed individual comparable with *Miliolina rotunda* or *M. labiosa*, followed by a straight or curving series of irregularly formed chambers terminating in a large, gaping, irregular orifice, narrowed down by a variable number of projecting teeth. It appears to be nothing more than a strongly-developed *Nubecularia bradyi*, and is certainly much more closely allied to that form than to the milioline series of the initial chambers. The more regularly shaped specimens suggest *Nevillina coronata* (Millett), but are very different from Sidebottom's specimens (Manchester Mem. vol. xlix. 1905, No. 11), the types of which are

in our collection. The points of difference lie in the extremely regular disposition of the chambers in *Nevillina*, and particularly in the distinctive crown-like aperture. Millett's original type-specimen of *Biloculina coronata*, which is also in our collection, is, on the contrary, much more likely to be referable to *Nubecularia schauinslandi* than to *Nevillina coronata*, its only point of identity with *Nevillina* being the fact that the projecting teeth round the aperture actually meet and coalesce instead of remaining distinct and separate as in *Nubecularia schauinslandi*. Otherwise the whole structure and appearance of the specimen is distinctly nubecularine and has no feature in common with *Nevillina coronata*.

Sub-family MILIOLININÆ.

BILOCULINA *d'Orbigny*.

4. BILOCULINA RINGENS, var. STRIOLATA *Brady*.

Biloculina ringens, var. *striolata* Brady, 1884, FC. p. 143, pl. 3. figs. 7, 8.

" " " Millett, 1898, etc., FM. 1898, p. 262, pl. 5.
fig. 8.

" " " Heron-Allen & Earland, 1914-15, FKA.
p. 551.

Rare. The specimens agree entirely with Brady's description and figure.

5. BILOCULINA SARSI *Schlumberger*.

Biloculina sarsi Schlumberger, 1891, BGF. p. 166, pl. 9. figs. 55-59, text-
figs. 10-12.

" " Cushman, 1921, FP. p. 471, pl. 97. fig. 1, text-fig. 48.

Rare. The specimens are fairly large and distinctive.

6. BILOCULINA DEPRESSA *d'Orbigny*.

Biloculina depressa d'Orbigny, 1826, TMC. p. 298, no. 7; Modèle, no. 91.

" " Brady, 1884, FC. p. 145, pl. 2. figs. 12, 15-17; pl. 3.
figs. 1, 2.

Very rare.

7. BILOCULINA DEPRESSA, var. SERRATA *Bailey*.

Biloculina depressa, var. *serrata* Bailey, 1861, New Spp. Micr. Org. Para River,
S. America. Boston Journ. Nat. Hist.
vol. vii. p. 350, pl. 8. fig. E.

" " " Cushman, 1910, etc., FNP. 1917, p. 75, pl. 29.
fig. 2.

A single specimen, the serration being confined to the aboral half of the shell.

8. *BILOCULINA ELONGATA* d'Orbigny.*Biloculina elongata* d'Orbigny, 1826, TMC. p. 298, no. 4.

" " Brady, 1884, FC. p. 144, pl. 2. fig. 9.

" " Heron-Allen & Earland, 1913, CI. p. 22, pl. 1. fig. 4.

Very rare, but fairly typical.

9. *BILOCULINA OPPOSITA* Deshayes.*Biloculina opposita* Deshayes, 1831, CCT. p. 252, pl. 3. figs. 8-10.

" " Bronn, 1837, LG. p. 1143, pl. 42. fig. 30.

(Encycl. Méthodique, vol. ii. p. 138, *vide* Bronn.)" *oblonga* d'Orbigny, 1839, FC. p. 163, pl. 8. figs. 21-23.

Three small but distinctive specimens which agree remarkably well with Deshayes' figures, except as regards the tooth, which is not strongly furcate as in his specimens, but less prominent as in d'Orbigny's *B. oblonga*, which is, in other respects, identical with Deshayes' earlier figure. This form may be regarded as an abbreviated and inflated variety of *B. elongata*.

SPIROLOCULINA d'Orbigny.

10. *SPIROLOCULINA ANTILLARUM* d'Orbigny.*Spiroloculina antillarum* d'Orbigny, 1839, FC. p. 166, pl. 9. figs. 3, 4.

" " Brady, 1884, FC. p. 155, pl. 10. fig. 21.

" " Heron-Allen & Earland, 1908, etc., SB. 1911, p. 301.

Abundant. One of the most typical forms in the gathering. The final pair of chambers is usually so turgid as almost to enclose all the preceding chambers.

11. *SPIROLOCULINA CANALICULATA* d'Orbigny.*Spiroloculina canaliculata* d'Orbigny, 1846, FFV. p. 269, pl. 16. figs. 10-12." " Jones, Parker, & Brady, 1866, etc., MCF. p. 16
pl. 3. figs. 39, 40.

" " Cushman, 1921, FP. p. 395, pl. 80. fig. 3.

Very rare and weak, and exhibiting a tendency to separation of the chambers, so as to leave lacunæ between the adjacent chambers, as in *S. acutimargo* Brady.

12. *SPIROLOCULINA PLANULATA* (Lamarck).*Miliolites planulata* Lamarck, 1804, AM. p. 352, no. 4.*Spiroloculina* " Brady, 1884, FC. p. 148, pl. 9. fig. 11.

" " Heron-Allen & Earland, 1914-15, FKA. p. 555.

A single large specimen which on one side is plane and on the other feebly costate, a variation referred to in FKA. (*ut supra*).

13. SPIROLOCULINA TENUIROSTRA *Karrer*. (Pl. 35. figs. 6, 7.)

- Spiroloculina tenuirostra* Karrer, 1867, FO. p. 358, pl. 2. fig. 5.
 „ *acutimargo* Brady, 1884, FC. p. 154, pl. 10. fig. 14 (only).
 „ „ Egger, 1893, FG. p. 222, pl. 1. figs. 26-28.

A single specimen, identical with Egger's figure of *S. acutimargo* Brady. Under this name Brady figures three distinctive forms. Fig. 12 is clearly *S. affixa* Terquem. Figs. 13 and 15 are what we may regard as *S. acutimargo* proper. Fig. 14 is a quite distinctive little shell which Cushman (C. 1921, FP. p. 398), under *S. acutimargo*, attributes to the genus *Massilina*. It is the same as Egger's figure and is in our opinion attributable to *S. tenuirostra* Karrer, the distinctive features of which are a sharp angular edge to the thin embracing chambers, almost meeting over the faces of the shell. In our specimen the embracing character is so marked that the two final chambers with their flanges envelop the entire face, and the separate chambers are only visible where the surface of the test is abraded. We have observed this form in many tropical coral sands.

MILIOLINA *Williamson*.14. MILIOLINA CIRCULARIS (*Bornemann*).

- Triloculina circularis* Bornemann, 1855, FSH. p. 349, pl. 19. fig. 4.
Miliolina „ Brady, 1884, FC. p. 169, pl. 4. fig. 3; pl. v. figs. 13, 14 (?).
 „ „ Heron-Allen & Earland, 1914-15, FKA. p. 557.

Abundant, and very variable in size. Both biloculine and triloculine forms, as figured by Millett (M. 1898, etc., FM. 1898, p. 499, pl. 11. figs. 1-3), the biloculine being relatively rare.

15. MILIOLINA VALVULARIS (*Reuss*).

- Triloculina valvularis* Reuss, 1851, FSUB. p. 85, pl. 7. fig. 56.
Miliolina „ Brady, 1884, FC. p. 161, pl. 4. figs. 4, 5.
 „ „ Heron-Allen & Earland, 1913, CI. p. 27.

Fairly frequent, but small.

16. MILIOLINA DILATATA (*d'Orbigny*).

- Quinqueloculina dilatata* d'Orbigny, 1839, FC. p. 192, pl. 11. figs. 28-30.
 „ „ Schlumberger, 1893, MGM. p. 75, text-figs. 29, 30,
 pl. 3. figs. 70-74; pl. 4. figs. 87-90.
Miliolina „ Heron-Allen & Earland, 1914-15, FKA. p. 559.

Two large characteristic individuals.

17. MILIOLINA LABIOSA (*d'Orbigny*).

- Triloculina labiosa* d'Orbigny, 1839, FC. p. 178, pl. 10. figs. 12-14.
Miliolina „ Brady, 1884, FC. p. 170, pl. 6. figs. 3-5.
 „ „ Millett, 1898, etc., FM. 1898, p. 502, pl. 11. figs. 8, 9.

Rare, but typical.

18. *MILIOLINA SUBROTUNDA* (Montagu).*Vermiculium subrotundum* Montagu, 1803, TB. pt. 2, p. 521.*Miliolina subrotunda* Brady, 1884, FC. p. 168, pl. 5. figs. 10, 11.

Frequent and small.

19. *MILIOLINA SEMINUDA* (Reuss).*Quinqueloculina seminuda* Reuss, 1866, FABS. p. 125, pl. 1. fig. 11.*Miliolina subrotunda* (Montagu), var., Wright, 1885-6, BLP. p. 319, p. 26. fig. 5.,, *seminuda* Heron-Allen & Earland, 1914-15, FKA. p. 560.

Not uncommon, variable in the number of striæ, which tend to spread over the entire surface of the shell, thus linking the species with *M. webbiana* (d'Orb.).

20. *MILIOLINA WEBBIANA* (d'Orbigny).*Triloculina webbiana* d'Orbigny, 1839, FIC, p. 140, pl. 3. figs. 13-15.*Miliolina fichteliana* Brady, 1884, FC. p. 169, pl. 4. fig. 9.,, *suborbicularis* Millett, 1898, etc., FM. 1898, p. 502, pl. 11. fig. 13.,, *webbiana* Heron-Allen & Earland, 1914-15, FKA. p. 560.

Rare.

21. *MILIOLINA TRIGONULA* (Lamarck).*Miliolites trigonula* Lamarck, 1804, AM. vol. v. p. 351, no. 3.*Triloculina* ,, d'Orbigny, 1826, TMC. p. 299, pl. 16, figs. 5-9; Modèle, no. 93.*Miliolina* ,, Brady, 1884, FC. p. 164, pl. 3. figs. 14-16.

Frequent. All the specimens are of the very elongate type, comparable with *M. affinis* (d'Orb.) (F. 1905, SOM. p. 59, pl. 1. fig. 2).

22. *MILIOLINA TRICARINATA* (d'Orbigny).*Triloculina tricarinata* d'Orbigny, 1826, TMC. p. 299. no 7; Modèle, no. 94.*Miliolina* ,, Brady, 1884, FC. p. 165, pl. 3. fig. 17.*Triloculina* ,, Cushman, 1921, FP. p. 454, figs. 35, 36.

Rare. Both long and short forms occur.

23. *MILIOLINA BERTHELINIANA* Brady.*Miliolina bertheliniana* Brady, 1884, FC. p. 166, pl. 114. fig. 2.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 563, pl. 41. figs. 32-35.

Very rare. Both long and short forms occur.

24. *MILIOLINA CULTRATA* Brady.*Miliolina cultrata* Brady, 1879, etc., RRC. 1881, p. 45.

,, ,, Brady, 1884, FC. 161, pl. 5. figs. 1, 2.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 564, pl. 42. figs. 1-10.

A single very long and delicate individual.

25. MILIOLINA BOSCIANA (*d'Orbigny*).

- Quinqueloculina bosciiana* d'Orbigny, 1839, FC. p. 191, pl. 11. figs. 22-24.
Miliolina " Millett, 1898, etc., FM. 1898, p. 267, pl. 6. fig. 1.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 566.

Small, but not uncommon.

26. MILIOLINA OBLONGA (*Montagu*).

- Vermiculium oblongum* Montagu, 1803, TB. p. 522, pl. 14. fig. 9.
Miliolina oblonga Brady, 1884, FC. p. 160, pl. 5. fig. 4.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 566.

Not uncommon. Both the square and the rounded types occur, the rounded predominating. One of the latter is characterized by a long stopper-like tooth, such as we noted from Clare Island (H.-A. & E. 1913, CI. p. 25).

27. MILIOLINA ROTUNDA (*d'Orbigny*).

- Triloculina rotunda* d'Orbigny, 1826, TMC. p. 299, no. 4.
Miliolina " Millett, 1898, etc., FM. 1898, p. 267, pl. 5. figs. 15, 16.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 568, pl. 42.
 figs. 27-30.

Two distinct forms occur, one moderately frequent of the triloculine type figured by Millett (*ut supra*), the other of the distinctive d'Orbignyan type, large, thick-shelled, and finely striate.

28. MILIOLINA VULGARIS (*d'Orbigny*).

- Quinqueloculina vulgaris* d'Orbigny, 1826, TMC. p. 302, no. 33.
 " " Schlumberger, 1893, MGM. p. 65, pl. 2. figs. 65, 66,
 & woodcuts 13, 14.
Miliolina vulgaris Heron-Allen & Earland, 1914-15, FKA. p. 569.

Large, typical, and frequent.

29. MILIOLINA SEMINULUM (*Linné*).

- Serpula seminulum* Linné, 1767, SN. p. 1264, no. 791.
Miliolina " Brady, 1884, FC. p. 157, pl. 5. fig. 6.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 569.

Common. Varying greatly in size and occasionally reaching very large dimensions.

30. MILIOLINA (TRILOCULINA) LÆVIGATA (*d'Orbigny*).

- Triloculina lævigata* d'Orbigny, 1826, TMC. p. 300, no. 15.
 " " Terquem, 1878, FEP. p. 57, pl. 5. (10) figs. 20-21.
 " " Schlumberger, 1893, MGM. p. 205, pl. 1. figs. 45-47.
 " " Heron-Allen & Earland, 1922, FGA. pl. 1. figs. 11-14.

Two quite typical specimens. The surface-texture is rather rough.

31. *MILIOLINA TRIANGULARIS* (*d'Orbigny*).

Quinqueloculina triangularis d'Orbigny, 1826, TMC. p. 302, no. 34; 1846, FFV. p. 288, pl. 18. figs. 7-9.

Miliolina " Jones, Parker, & Brady, 1866, etc., MFC. 1895, p. 118, pl. 4. fig. 1, and pl. 6. figs. 2, a-b.

Typical specimens. Rare.

32. *MILIOLINA AUBERIANA* (*d'Orbigny*).

Quinqueloculina auberiana d'Orbigny, 1839, FC. p. 193, pl. 12. figs. 1-3.

Miliolina " Brady, 1884, FC. p. 162, pl. 5. figs. 8, 9.

" " Heron-Allen & Earland, 1914-15, FKA. p. 571.

Common and generally small. Large and typical specimens are rare.

33. *MILIOLINA AUBERIANA*, var. *SEMIRETICULATA*, nov. (Pl. 35. figs. 8-10.)

Having the characteristic form of *M. auberiana*, but with the peripheral margins of the chambers reticulated. Cushman's *M. kerimbatica*, var. *philippinensis* (C. 1921, FP. p. 438, pl. 89. figs. 2, 3) is a similar form, but the periphery and median wing are rounded instead of sharp as in *M. auberiana*.

34. *MILIOLINA CUVIERIANA* (*d'Orbigny*).

Quinqueloculina cuvieriana d'Orbigny, 1839, FC. p. 190, pl. 11. figs. 19-21.

Miliolina " Brady, 1884, FC. p. 162, pl. 5. fig. 12.

" " Heron-Allen & Earland, 1914-15, FKA. p. 571, pl. 42. figs. 33-36.

One weak specimen.

35. *MILIOLINA BICOSTATA* (*d'Orbigny*).

Quinqueloculina bicostata d'Orbigny, 1839, FC. p. 195, pl. 12. figs. 8-10.

Miliolina bicostata Goës, 1894, ASF. p. 112, pl. 20. fig. 855.

" " Heron-Allen & Earland, 1914-15, FKA. p. 572, pl. 42. figs. 42-45.

Large and well-developed and fairly frequent. The specimens differ from the Kerimba individuals in the aperture, which is normal, round, and furnished with the usual tooth, agreeing in these respects with the figure of Goës.

36. *MILIOLINA UNDOSA* (*Karrer*).

Quinqueloculina undosa Karrer, 1867, FO. p. 361, pl. 3. fig. 3.

Miliolina undosa Brady, 1884, FC. p. 176, pl. 6. figs. 6-8.

" " Heron-Allen & Earland, 1914-15, FKA. p. 572, pl. 43. figs. 1-4.

Frequent and typical.

37. *MILIOLINA UNDULATA* (*d'Orbigny*).

Quinqueloculina undulata d'Orbigny, 1826, TMC. p. 302, no. 27.

" " Schlumberger, 1893, MGM. p. 71, pl. 1. figs. 53, 54; pl. 2. figs. 60, 61; text-figs. 23, 24.

Miliolina undulata Heron-Allen & Earland, 1914-15, FKA. p. 573, pl. 43.
figs. 5-8.

Very rare and rather small, but quite typical.

38. *MILIOLINA RETICULATA* (*d'Orbigny*).

Trilocolina reticulata d'Orbigny, 1826, TMC. p. 299, no. 9.

Miliolina „ Brady, 1884, FC. p. 177, pl. 9. figs. 2-4.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 573, pl. 43.
figs. 9, 10.

Frequent and large, of the quinqueloculine rounded type, with coarse markings.

39. *MILIOLINA PARKERI* *Brady*.

“Quinqueloculina with oblique ridges,” Parker, 1858, MIS. p. 53, pl. 5. fig. 10.

Miliolina parkeri Brady, 1884, FC. p. 177, pl. 7. fig. 14.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 574, pl. 43.
figs. 11, 12.

Very rare, but large and typical specimens.

40. *MILIOLINA KERIMBATICA* *Heron-Allen & Earland*.

Miliolina kerimbatica Heron-Allen & Earland, 1914-15, FKA. p. 575, pl. 43.
figs. 13-23.

Quinqueloculina „ Cushman, 1921, FP. p. 437.

A single large and typical individual.

41. *MILIOLINA FUSCA* *Brady*.

Quinqueloculina fusca Brady, 1870, FTR. p. 286, pl. 11. fig. 2.

„ „ Schulze, 1874, etc., R. 1875, p. 134, pl. 6. figs. 19, 20.

Miliolina „ „ Heron-Allen & Earland, 1914-15, FKA. p. 576.

Rare, but large and well-developed.

42. *MILIOLINA CONTORTA* (*d'Orbigny*).

Quinqueloculina contorta d'Orbigny, 1846, FFV. p. 298, pl. 20. figs. 4-6.

Miliolina „ „ Goës, 1894, ASF. p. 111, pl. 20. figs. 851, 852.

„ „ Cushman, 1921, FP. p. 432, pl. 90. fig. 1.

Frequent and large.

43. *MILIOLINA FERUSSACHII* (*d'Orbigny*).

Quinqueloculina ferussachii d'Orbigny, 1826, TMC. p. 301, no. 18; Modèle,
no. 32.

Miliolina „ „ Brady, 1884, FC. p. 175, pl. 113. fig. 17.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 578.

Frequent, and all of the feeble smooth type figured by Millett (M. 1898, etc., FM. 1898, p. 508, pl. 12. fig. 7 [fig. 6 in text]).

44. MILIOLINA LINNÆANA (*d'Orbigny*).*Triloculina linnæiana* d'Orbigny, 1839, FC. p. 172, pl. 9. figs. 11-13.*Miliolina linnæana* Brady, 1884, FC. p. 174, pl. 6. figs. 15-20.

" " Heron-Allen & Earland, 1914-15, FKA. p. 579.

A few very large and typical specimens.

45. MILIOLINA STRIATA (*d'Orbigny*).*Quinqueloculina striata* d'Orbigny, 1826, TMC. p. 301, no. 4.

" " Terquem, 1882, FEP. p. 184, pl. 20. (23) figs. 10-12.

Miliolina " Heron-Allen & Earland, 1914-15, FKA. p. 579, pl. 44.
figs. 13-17.

Rare; very small and weak.

46. MILIOLINA STELLIGERA (*Schlumberger*).*Quinqueloculina stelligera* Schlumberger, 1893, MGM. p. 68, pl. 2. figs. 58, 59.*Miliolina* " Heron-Allen & Earland, 1913, CI. p. 31, pl. 1.
figs. 14, 15; 1916, FWS. p. 215, pl. 39, figs. 28-31.

Rare, but typical.

Sub-family HAUERININÆ.

HAUERINA *d'Orbigny*.47. HAUERINA COMPRESSA *d'Orbigny*.*Hauerina compressa* d'Orbigny, 1846, FFV. p. 119, pl. 5. figs. 25-27.

" " Brady, FC. p. 190, pl. 11. figs. 12, 13.

" " Heron-Allen & Earland, 1914-15, FKA. p. 588.

A single undoubted specimen.

48. HAUERINA ORNATISSIMA (*Karrer*).*Quinqueloculina ornatissima* Karrer, 1868, MFKB. p. 151, pl. 3. fig. 2.*Hauerina* " Brady, 1884, FC. p. 192, pl. 7. figs. 15-22.

" " Heron-Allen & Earland, 1914-15, FKA. p. 590.

Two rather poor specimens, not developed to the outspreading stage.

PLANISPIRINA *Seguenza*.49. PLANISPIRINA AURICULATA *Egger*.*Planispirina auriculata* Egger, 1893, FG. p. 245, pl. 3. figs. 13-15." " Heron-Allen & Earland, 1914-15, FKA. p. 590,
pl. 46. figs. 3-7.Rare, but the two forms differing in relative length and breadth occur, as described in our Kerimba Monograph (*ut supra*).

Sub-family FISCHERININÆ.

FISCHERINA *Terquem.*50. FISCHERINA PELLUCIDA *Millett.*

Fischerina pellucida Millett, 1898, etc., FM. 1898, p. 611, pl. 13, figs. 14, 15.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 591.

One excellent and typical specimen.

Sub-family PENEROPLIDINÆ.

CORNUSPIRA *Schultze.*51. CORNUSPIRA INVOLVENS *Reuss.*

Operculina involvens Reuss, 1849-50, FOT. p. 370, pl. 1. (46) fig. 20 (not 30).
(*Cornuspira*, 1861; Model, no 15.)

Cornuspira „ [Brady, 1884, FC. p. 200, pl. 11, figs. 1-3.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 593.

Minute, but not infrequent. Both megal- and microspheric forms, the first predominating as usual.

52. CORNUSPIRA SELSEYENSIS *Heron-Allen & Earland.*

Cornuspira ? Earland, 1905, FBS. p. 199, pl. 13, figs. 2-4.

Cornuspira selseyensis Heron-Allen & Earland, 1908, etc., SB. 1909, p. 319,
pl. 15, figs. 9-11.

Small and rare.

PENEROPLIS *Montfort.*53. PENEROPLIS PERTUSUS (*Forskål.*).

Nautilus pertusus Forskål, 1775, Descriptio animalium, p. 125, no. 65.

Peneroplis „ Brady, 1884, FC. p. 204, pl. 13, figs. 16, 17.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 601.

Very rare and extremely pauperate in structure.

54. PENEROPLIS CARINATUS *d'Orbigny.*

Peneroplis carinatus d'Orbigny, 1839, FAM. p. 33, pl. 3, figs. 7, 8.

„ „ Brady, 1884, FC. p. 205, pl. 13, fig. 14.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 602.

Also rare, but less pauperate than the *pertusus* type.

ORBITOLITES *Lamarck.*55. ORBITOLITES DUPLEX *Carpenter.*

Orbitolites duplex Carpenter, 1856, etc., RF. 1856, p. 220, pl. 5, fig. 10 ;
pl. 9, fig. 10.

„ „ Brady, 1884, FC. p. 216, pl. 16, fig. 7.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 605.

Comparatively infrequent as compared with *O. complanata*. A few specimens exhibit a crumpled development of the marginal rows of chambers, approaching the structure of *Orbitolites complanata* (*Marginopora vertebralis*), var. *plicata* Dana (1846, in Wilkes's U.S. Exploring Exp. vol. vii. p. 706, pl. 60. fig. 9), which is better known under Brady's varietal name, var. *laciniata*, but there is no indication that these specimens represent a reproductive process as in Dana's variety.

56. ORBITOLITES COMPLANATA *Lamarck*.

Orbitolites complanata Lamarck, 1802, Syst. Anim. sans Vert. p. 376.

" " Brady, 1884, FC. p. 218, pl. 16. figs. 1-6; pl. 17 figs. 1-6.

" " Heron-Allen & Earland, 1914-15, FKA. p. 606.

Extremely common, but never reaching any great dimensions. No specimens of var. *plicata* or viviparous individuals were observed.

CRATERITES *Heron-Allen & Earland*.

CRATERITES, gen. nov.

This new genus is founded for the reception of a single specimen, which, while evidently closely connected with *Orbitolites*, cannot by any stretch of generic definition be included with hitherto recorded types. The closest search through the material available has not resulted in the discovery of other specimens or of anything which might be regarded as an earlier or more advanced condition of growth, and we feel compelled, against our usual practice, on such very insufficient data, to institute a new genus for what is unquestionably a novel and interesting type of construction. Future research may render it necessary to amplify or amend our description, or may possibly relegate the specimen to the position of a freak or a pathological development of *Orbitolites complanata*.

57. CRATERITES RECTUS, sp. nov. (Pl. 35. figs. 11, 12.)

The type-specimen is free, but the base, which is roughly quadrilateral in form, suggests that it was once sessile on some other object. The basal layer consists of a nubecularine mass of chambers without a trace of spiral disposition. Arising from this outspread basal layer is a thick trunk nearly circular in section, composed of five or six superimposed rings of chamberlets, orbitoline in appearance, but devoid of marginal pores. From this point the trunk rapidly increases to nearly double its diameter at its narrowest point by the addition of further superimposed rings of orbitoline chambers without marginal pores. The greatest diameter of the test is reached at a point which is about twelve layers of chambers above the rim of the base. From this widest point the upper surface of the test is completed by a thin and highly convex cover, which bears no trace of septation, but is entirely covered with

coarse perforations, like the rose of a watering-can. Where this oral layer, which closely resembles the marginal edge of *Orbitolites complanata*, has been broken away at a point on the edge, a similar cribrate septum is visible underneath.

The specimen bears a superficial resemblance to the Mycetozoan genus *Craterium*.

The genus represents a morphological variation of the normal structure of *Orbitolites complanata*. In that type the chamberlets form a disc, the sides of which are imperforate, while the edge of the disc is covered with cribrate apertures. In *Craterites* the disc is originally perforate on one side and imperforate round the edge. Growth ensues by the addition of a series of chambers, which must necessarily be superimposed over the aperture. Hence we get a series of discs superimposed on one another and with a circular cribrate covering over all in *Craterites*, while in *Orbitolites* the original disc increases rapidly in diameter by the addition of rings of concentric chamberlets.

Size:—

Height from edge of base to top of cover, 1.20 mm.

„ „ bottom of cover, .70 mm.

Diameter at base, .95 mm.

„ narrowest part of trunk, .55 mm.

„ widest part of trunk and junction of cover, .95 mm.

ALVEOLINA *d'Orbigny*.

58. ALVEOLINA MELO (*Fichtel & Moll*).

Nautilus melo Fichtel & Moll, 1798, TM. p. 118, pl. 24.

Alveolina „ Heron-Allen & Earland, 1914-15, FKA. p. 607.

A single large specimen.

Family ASTRORRHIZIDÆ.

Sub-family ASTRORRHIZINÆ.

IRIDIA *Heron-Allen & Earland*.

59. IRIDIA DIAPHANA *Heron-Allen & Earland*.

Iridia diaphana Heron-Allen & Earland, 1914-15, FKA. 1914, p. 371, pl. 36;
1915, p. 607.

The species is evidently abundantly attached to coral and nullipore fragments. Several good specimens were obtained, both sessile and detached, the latter exhibiting the dried protoplasmic body beneath the chitinous membrane.

DENDROPHRYA *Strethill Wright*.60. DENDROPHRYA *RADIATA Strethill Wright* (?).

Dendrophrya radiata Strethill Wright, 1861, Ann. & Mag. Nat. Hist. ser. 3, vol. viii. p. 122. (*No figure*.)

„ „ Brady, 1884, FC. p. 238, pl. 27 A. figs. 10-12.

Two large fragments which we ascribe to *Dendrophrya*, to which they bear a closer resemblance than to any other species. They represent fragments of an organism constructed of irregularly branching flattened tubes, formed of fine brown sand deposited upon a chitinous membrane. The interior of the tubes is more or less rough (semi-labyrinthic) with projecting material. The internal calibre of the tube is very large, the walls being comparatively thin. In the absence of further material we are unable to assign these fragments to any of the recorded species, and hesitate to give them a new name. It may be that our organism represents fragments of Cushman's suggested species *Dendrophrya ramosa* or its var. *robusta*. (C. 1921, FP. p. 56, pl. 18. figs. 7, 8.)

Sub-family RHABDAMMININÆ.

SAGENINA *Chapman*.61. SAGENINA *FRONDESCENS* (*Brady*).

Sagenella frondescens Brady, 1879, etc., RRC. 1879, p. 41, pl. 5. fig. 1.

Sagenina „ Chapman, 1899, FFA. p. 4, pl. 1. figs. 1, 2; pl. 2. figs. 1, 2.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 611.

Large and typical colonies attached to small stones.

Family LITUOLIDÆ.

Sub-family LITUOLINÆ.

HAPLOPHRAGMIUM *Reuss*.62. HAPLOPHRAGMIUM *COMPRESSUM* *Goës*.

Lituolina irregularis, var. *compressa* Goës, 1882, RRCS. p. 141, pl. 12. figs. 421-423.

Haplophragmium emaciatum Brady, 1884, FC. p. 305, pl. 33. figs. 26-28.

„ *compressum* Goës, 1896, DOA. p. 31.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 613, pl. 46. figs. 20, 21.

A single small and coarsely agglutinate specimen.

63. HAPLOPHRAGMIUM *CANARIENSE* (*d'Orbigny*).

Nonionina canariensis d'Orbigny, 1839, FIC. p. 128, pl. 2. figs. 33, 34.

Haplophragmium canariense Brady, 1884, FC. p. 310, pl. 35. figs. 1-5.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 614.

Common, and attaining large dimensions. Characterized by a thin white regular test, deeply ferruginous, and very neatly constructed of fine sand with a very considerable proportion of sponge-spicules.

64. HAPLOPHRAGMIUM ANCEPS *Brady*.

Haplophragmium anceps Brady, 1884, FC. p. 313, pl. 35. figs. 12-15.

„ „ Millett, 1898, etc., FM. 1899, p. 361, pl. 5. fig. 10.

„ „ Heron-Allen & Earland, 1913, CI. p. 47, pl. 3. fig. 4.

Two small, but typical specimens.

PLACOPSILINA *d'Orbigny*.

65. PLACOPSILINA CENOMANA *d'Orbigny*.

Placopsilina cenomana d'Orbigny, 1850, etc., PP. vol. ii. p. 185, no. 758.

Lituola (Placopsilina) cenomana Carpenter, Parker, & Jones, 1862, ISF. p. 143
pl. 11. fig. 14.

Placopsilina „ „ Brady, 1884, FC. p. 315, pl. 36. figs. 1-3.

A number of fragments agreeing in structure with this species, but all "free." It is possible that they may have been originally sessile upon some perishable organism.

DIFFUSILINA *Heron-Allen & Earland*.

DIFFUSILINA, gen. nov.

Test sessile, squamous, composed of very finely comminuted sand and mud enveloping a thin labyrinthic layer of chambers. External surface smooth and finished, white to grey in colour, furnished with a few sparsely distributed pustules of more loosely aggregated material.

The fragments of calcareous alga furnished many examples of this new type. It is at first very difficult to recognize owing to its colour harmonizing with that of its host. Its squamous form and habit of growing only in depressions and crevices of the alga add to the difficulty of detecting it, but when once recognized its presence can hardly be overlooked. It may possibly be a widely distributed type.

The affinities of *Diffusilina* are not easily discoverable. The neatly constructed test and high proportion of cement in the finished exterior surface indicate the Lituolidæ, but it has no close relationship to any previously recorded type. We suggest *Bdelloidina* as its nearest, but still a distant, ally.

66. DIFFUSILINA HUMILIS, sp. nov. (Pl. 35. figs. 13-16.)

Test sessile, of irregular outline, squamous, adapting its growth to depressions and crevices on the surface of its host (*diffusus* = poured out, spilled). Colour resembling its host, white to grey. External surface smoothly finished and flat; marginal edges thinned out so as to appear

almost continuous with the surface of attachment and presenting no sign of marginal apertures. Nearly all the specimens exhibit a varying number (1-4) of pustular processes on the superior surface. These rise slightly above the smoothly finished agglutinate surface, and appear to consist of the same fine sand and mud as the rest of the test, but without agglutinating cement. It appears probable that they represent apertures for the extension of protoplasm.

The test when laid open is seen to contain a single layer of intricately ramifying flat tubes, without septa, separated from one another by thin walls of agglutinated material and from the surface of the alga by a thin floor or pavement layer of similar material. The tubes are completely filled with a mass of dark protoplasm. The protoplasmic body is voluminous, dark in colour, and ramifies through the entire structure in a single layer separated from the surface of the alga by a floor of material similar to that used in the construction of the upper layer of the test.

Size very variable. Compact specimens 1-3 mm. in diameter, but narrow specimens following a crevice in their growth may probably attain four or five times this size.

HADDONIA *Chapman.*

67. HADDONIA TORRESIENSIS *Chapman.* (Pl. 35. figs. 17-22.)

Haddonia torresiensis Chapman, 1897, "On *Haddonia*, a new Genus of the Foraminifera from Torres Straits," Journ. Linn. Soc. Lond. vol. xxvi. (Zoology) (1898) pp. 452-456, pl. 28. & text-fig. p. 453.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 616, pl. 46. fig. 22.

Abundant and extremely variable both as regards size and relative irregularity of growth. This organism, which is so abundant in this material, appears to be unquestionably referable to Chapman's genus; but a study of the material leads us to differ from his conclusions as to its relationships. He placed his genus among the labyrinthic *Lituolinæ*; we feel inclined to transfer it to the *Textulariidae*, and we have even some doubt as to its generic value. A study of a series of specimens indicates that at Lord Howe Island growth starts as a free and regularly formed *Textularia* (*agglutinans* or *gramen*). After attaining almost full growth the chambers begin to run wild, and they may then assume practically any form—curving or straight lines, acervuline masses, remain free, attach themselves to large sand-grains, or become sessile upon other organisms, but often so lightly as to become detached without damage. The shell-structure is of coarse calcareous and siliceous grains with a large proportion of calcareous cement. Chapman states that "the test commences either with a straight or a sinuous series of chambers, or, more rarely, with a flat coil of a single whorl, after which the

chambers are arranged in a more or less rectilinear manner." In only one or two instances have we met with a coiled initial series. But for the established existence of *Haddonina* as a genus, and the fact that the Lord Howe specimens generally coincide with Chapman's diagnosis, we should have regarded our specimens as biological freaks, due perhaps to brackish-water conditions affecting the growth of the characteristic *Textularia* of the district, as such conditions of life have been proved to do.

Sub-family TROCHAMMININÆ.

TROCHAMMINA Parker & Jones.

68. TROCHAMMINA SQUAMATA Parker & Jones.

Trochammina squamata Parker & Jones, 1860, RMF. p. 304, table.

„ „ Brady, 1884, FC. p. 337, pl. 41. fig. 3.

„ „ Heron-Allen & Earland, 1913, CI. p. 50, pl. 3. figs. 7-10.

Small, pauperate, and very rare.

69. TROCHAMMINA OCHRACEA (*Williamson*).

Rotalina ochracea Williamson, 1858, RFGB. p. 55, pl. 4. fig. 112; pl. 5. fig. 113.

Trochammina „ „ Millett, 1898, etc., FM. 1899, p. 363, pl. 5. fig. 12.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 619, pl. 46. figs. 27, 28.

One extremely pauperate individual, showing the flange described by us from Kerimba (*ut supra*), and two small but typical specimens.

70. TROCHAMMINA ROTALIFORMIS *Wright*.

Trochammina inflata, var., Balkwill & Wright, 1885, DIS. p. 331, pl. 13. figs. 11, 12.

„ *rotaliformis* Heron-Allen & Earland, 1913, CI. p. 52, pl. 3. figs. 11-13.

Frequent and well-developed.

71. TROCHAMMINA VESICULARIS *Goës*.

Trochammina vesicularis Goës, 1894, ASF. p. 31, pl. 6. figs. 235-237.

One large and typical specimen of this high-domed type.

CARTERINA *Brady*.

72. CARTERINA SPICULOTESTA (*Carter*).

Rotalia spiculotesta H. J. Carter, 1877, "Description of a new Species of Foraminifera (*Rotalia spiculotesta*)," Ann. & Mag. Nat. Hist. ser. 4, vol. xx. p. 470, pl. 16; 1879, ser. 5, vol. iii. p. 414; 1880, SGM. ser. 5, vol. v. p. 452.

Carterina spiculotesta Brady, 1884, FC. p. 346, pl. 41. figs. 7-10.

„ „ Sidebottom, 1906, etc., RFD. 1905, p. 6, pl. 1. fig. 10.

A single undoubted fragment, representing a terminal chamber. The individual when perfect must have been of considerable size.

Family TEXTULARIIDÆ.

Sub-family TEXTULARIINÆ.

TEXTULARIA *DeFrance.*

73. TEXTULARIA FOLIUM *Parker & Jones.*

Textularia folium Parker & Jones, 1865, NAAF. pp. 370 & 450, pl. 18. fig. 19.

„ „ Brady, 1884, FC. p. 357, pl. 42. figs. 1-5.

„ „ Chapman, 1907, RFV. p. 127, pl. 9. fig. 4.

A single specimen.

74. TEXTULARIA INCONSPICUA, var. JUGOSA (*Brady*).

Textularia jugosa Brady, 1884, FC. p. 358, pl. 42. fig. 7.

„ *inconspicua*, var. *jugosa* Millett, 1898, etc., FM. 1899, p. 558, pl. 7. fig. 2.

„ „ „ Heron-Allen & Earland, 1908, etc., SB. 1911, p. 310, pl. 9. fig. 12; 1914-15, FKA. p. 624.

One typical specimen.

75. TEXTULARIA RHOMBOIDALIS *Millett.*

Textularia rhomboidalis Millett, 1898, etc., FM. 1899, p. 559, pl. 7. fig. 4.

„ „ Sidebottom, 1904, etc., RFD. 1905, p. 8, pl. 2. figs. 2, ? 3.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 624.

Very abundant and very variable, the marginal edges ranging from quite straight to strongly scalloped, owing to the projection of the extremities of the chambers. The median line is often deeply excavated. Small specimens are often so compressed as to be with difficulty separated from *Bolivina*. Limbation of the sutural lines often gives a highly decorative appearance to the shell.

76. TEXTULARIA CRISPATA *Brady.*

Textularia crispata Brady, 1884, FC. p. 359, pl. 113. fig. 2.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 624, pl. 47. figs. 5, 6.

Two specimens, one very large and quite typical, the other small.

77. *TEXTULARIA* *SAGITTULA* *Defrance.*

Textularia sagittula Defrance, 1824, Dict. Sci. Nat. vol. xxxii. p. 177; vol. liii.
p. 344; Atlas Conch. pl. 13. fig. 5.

„ „ Brady, 1884, FC. p. 361, pl. 42. figs. 17, 18.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 625.

Very rare.

78. *TEXTULARIA* *SAGITTULA*, var. *FISTULOSA* *Brady.*

Textularia sagittula, var. *fistulosa* Brady, 1884, FC. p. 362, pl. 42. figs. 19-22.

„ „ „ Millett, 1898, etc., FM. 1899, p. 561, pl. 7.
fig. 9.

Also rare and small.

79. *TEXTULARIA* *RUGOSA* (*Reuss*).

Plecanium rugosum Reuss, 1869, FOG. p. 453, pl. 1. fig. 3.

Textularia rugosa Brady, 1884, FC. p. 625, pl. 42. figs. 23, 24.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 625, pl. 47.
figs. 7-9.

Large, but not very strongly marked.

80. *TEXTULARIA* *AGGLUTINANS* *d'Orbigny.*

Textularia agglutinans d'Orbigny, 1839, FC. p. 144, pl. 1. figs. 17, 18, 32-34.

„ „ Brady, 1884, FC. p. 363, pl. 43. figs. 1-3.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 626.

Abundant and subject to much variation in the direction of irregular growth, suggestive of incipient progress towards *Haddonina*, q. v.

81. *TEXTULARIA* *CANDEIANA* *d'Orbigny.*

Textularia candeiana d'Orbigny, 1839, FC. p. 143, pl. 1. figs. 25-27.

„ „ Sidebottom, 1904, etc., RFD. 1905, p. 7, pl. 2. fig. 1.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 627, pl. 47.
figs. 10-16.

Not uncommon, but not very strongly developed or typical.

82. *TEXTULARIA* *ABBREVIATA* *d'Orbigny.*

Textularia abbreviata d'Orbigny, 1846, FFV. p. 249, pl. 15. figs. 9-12 (not
7-12).

„ *agglutinans*, var. *abbreviata* Parker & Jones, 1865, NAAF. p. 369,
pl. 17. fig. 76.

„ *abbreviata* Heron-Allen & Earland, 1922, T.N. p. 120.

One large stoutly built specimen.

83. *TEXTULARIA* *GRAMEN* *d'Orbigny.*

Textularia gramen d'Orbigny, 1846, FFV. p. 248, pl. 15. figs. 4-6.

„ „ Brady, 1884, FC. p. 365, pl. 43. figs. 9, 10.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 627.

Common, and exhibiting the same tendency to *Haddonia*-formation as *T. agglutinans*.

84. *TEXTULARIA CONICA* d'Orbigny.

Textularia conica d'Orbigny, 1839, FC. p. 143, pl. 1. figs. 19, 20.

" " Brady, 1884, FC. p. 365, pl. 43. figs. 13, 14; pl. 113. fig. 1.

" " Heron-Allen & Earland, 1914-15, FKA. p. 629.

Common.

85. *TEXTULARIA CONICA*, var. *JUGOSA* Jones & Millett.

Textularia sagittula, var. *jugosa* Jones; Millett, 1898, etc., FM. 1899, p. 561, pl. 7. fig. 8.

A few small specimens comparable with Millett's figure (*ut supra*), which appears to us to be referable to *T. conica* rather than to *T. sagittula*.

VERNEUILINA d'Orbigny.

86. *VERNEUILINA SPINULOSA* Reuss.

Verneuilina spinulosa Reuss, 1849-50, FOT. p. 374, pl. 2. (47) fig. 12.

" " Brady, 1884, FC. p. 384, pl. 47. figs. 1-3.

" " Heron-Allen & Earland, 1914-15. FKA. p. 630.

Not uncommon. All the specimens are of the broad heavy type, destitute of spines.

87. *VERNEUILINA POLYSTROPHA* (Reuss).

Bulimina polystropha Reuss, 1845-46, VBK. pt. 2, p. 109, pl. 24. fig. 53.

Verneuilina " Brady, 1884, FC. p. 386, pl. 47. fig. 9.

" " Heron-Allen & Earland, 1929, VP. (*passim*).

Minute and very rare.

88. *VERNEUILINA PROPINQUA* Brady.

Verneuilina propinqua Brady, 1884, FC. p. 387, pl. 47. figs. 8-12 (not 13, 14).

" " Cushman, 1910, etc., FNP. 1911, p. 56, fig. 92.

A single minute but typical specimen.

TRITAXIA Reuss.

89. *TRITAXIA LEPIDA* Brady.

Tritaxia lepida Brady, 1879, etc., RRC. 1881, p. 55.

" " Brady, 1884, FC. p. 389, pl. 49. fig. 12.

" " Millett, 1898, etc., FM. 1900, p. 12, pl. 1. fig. 15.

Frequent.

PAVONINA d'Orbigny.

90. *PAVONINA FLABELLIFORMIS* d'Orbigny.

Pavonina flabelliformis d'Orbigny, TMC. p. 260, no. 1, pl. 10. figs. 10, 11; Modèle, no. 56.

Pavonina flabelliformis Brady, 1884, FC. p. 374, pl. 45. figs. 17-21.

" " Heron-Allen & Earland, 1914-15, FKA. p. 632,
pl. 48. figs. 1-6.

One broken specimen which, when perfect, must have been of very large size.

SPIROPLECTA *Ehrenberg.*

91. SPIROPLECTA BIFORMIS (*Parker & Jones.*)

Textularia agglutinans, var. *biformis* Parker & Jones, 1865, NAAF. p. 370,
pl. 15. figs. 23, 24.

Spiroplecta biformis Brady, 1884, FC. p. 376, p. 45. figs. 25-27.

" " Heron-Allen & Earland, 1914-15, FKA. p. 634.

One typical specimen.

GAUDRYINA *d'Orbigny.*

92. GAUDRYINA SCABRA *Brady.*

Gaudryina scabra Brady, 1884, FC. p. 381, pl. 12. fig. 5.

" " Heron-Allen & Earland, 1914-15, FKA. p. 635, pl. 48.
figs. 7-14.

Rare. The specimens are small, but compare in all respects with those figured by us (*ut supra*). We there suggested that they might be multiform variations of *Verneuilina polystropha*, and the Lord Howe specimens confirm that view.

93. GAUDRYINA RUGOSA (*d'Orbigny.*)

Gaudryina rugosa d'Orbigny, 1840, CBP. p. 44, pl. 4. figs. 20, 21.

" " Brady, 1884, FC. p. 381, pl. 46. figs. 14-16.

" " Heron-Allen & Earland, 1914-15, FKA. p. 635; 1922,
TN. p. 122.

Very common and finely developed. As in the New Zealand area, two distinct types occur, to which we have called attention in our 'Terra Nova' Report (*ut supra*), one long and the other short.

Subfamily BULIMININÆ.

BULIMINA *d'Orbigny.*

94. BULIMINA ELEGANTISSIMA *d'Orbigny.* (Pl. 35. figs. 23, 24.)

Bulimina elegantissima d'Orbigny, 1839, FAM. p. 51, pl. 7. figs. 13, 14.

" " Brady, 1884, FC. p. 402, pl. 50. figs. 20-22.

" " Heron-Allen & Earland, 1914-15, FKA. p. 629.

Rare, but characteristic, and an interesting series; two specimens exhibiting budding-off tests, of one and two chambers respectively, precisely similar to those figured by Heron-Allen (1915, RPF), and by Sidebottom

under the type-species *B. elegantissima* (S. 1904, etc., RFD. 1905, p. 11, pl. 2. figs. 7-12), also a specimen in which the terminal septal face and terminal septa have been absorbed.

95. *BULIMINA WILLIAMSONIANA* *Brady*.

- Bulimina williamsoniana* Brady, 1884, FC. p. 408, pl. 51. figs. 16, 17.
 " " Millett, 1898, etc., FM. 1900, p. 279, pl. 2. fig. 8.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 641.

One very minute specimen.

BOLIVINA d'Orbigny.

96. *BOLIVINA PUNCTATA* *d'Orbigny*.

- Bolivina punctata* d'Orbigny, 1839, FAM. p. 63, pl. 8. figs. 10-12.
 " " Brady, 1884, FC. p. 417, pl. 52. figs. 18, 19.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 644.

Common, but rather weakly developed.

97. *BOLIVINA TEXTILARIOIDES* *Reuss*.

- Bolivina textilarioides* Reuss, 1862, NHG. p. 81, pl. 10. fig. 1.
 " " Brady, 1884, FC. p. 419, pl. 52. figs. 23-25.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 645.

Rare and small. A variety also occurs in greater numbers, characterized by a broad compressed shell with rounded aboral extremity, five or six pairs of chambers, separated by strongly limbate sutural lines. The parallel arrangement of these lines indicates its affinity to *B. textilarioides*, but it differs considerably from the type. The form is not infrequent in tropical shallow-water gatherings.

98. *BOLIVINA DILATATA* *Reuss*.

- Bolivina dilatata* Reuss, 1849-50, FOT. p. 381, pl. 3. (48) fig. 15.
 " " Brady, 1884, FC. p. 418, pl. 52. figs. 20, 21.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 645.

Rare and far from typical.

99. *BOLIVINA TORTUOSA* *Brady*.

- Bolivina tortuosa* Brady, 1884, FC. p. 420, pl. 52. figs. 31-34.
 " " Heron-Allen & Earland, 1913, CI. p. 66, pl. 5. fig. 1; 1914-15, FKA. p. 645.

Large and well-developed, but rare.

100. *BOLIVINA ROBUSTA* *Brady*.

- Bolivina robusta* Brady, 1884, FC. p. 421, pl. 53. figs. 7-9.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 646.

One very small but otherwise typical specimen

101. *BOLIVINA LIMBATA* *Brady*.

Bolivina limbata Brady, 1884, FC. p. 419, pl. 52. figs. 26-28

„ „ Heron-Allen & Earland, 1913, CI. p. 67, pl. 5. figs. 2, 3;
1914-15, FKA. p. 646, pl. 50. figs. 1-4.

Rare, but large and well-developed. Most of the specimens are bifarine in their later development.

102. *BOLIVINA LIMBATA*, var. *ABBREVIATA*, nov. (Pl. 36. figs. 25-27.)

Test compressed, consisting of 4 to 7 pairs of chambers with rounded marginal edges, heavily limbate but with flush sutures. Aboral extremity rounded. The shell reaches its maximum breadth at about the third pair of chambers, and therefore the sides are almost parallel. Aperture large, extending over the septal face of the final chamber. Surface of the chambers prominently perforate between the clear sutural lines.

This is a very easily recognized little form, and not uncommon in shallow-water tropical gatherings. It may represent an intermediate type between *B. textularioides* (which it resembles in the straight sutural lines, almost vertical to the long axis) and the typical *B. limbata*. It never, so far as we have observed, has that tendency to develop a bifarine terminal portion so characteristic of the latter species.

103. *BOLIVINA VARIABILIS* (*Williamson*).

Textularia variabilis (typica) Williamson, 1858, RFGB. p. 76, pl. 6. figs. 162, 163.

Bolivina „ „ Heron-Allen & Earland, 1914-15, FKA. p. 647.

The most typical *Bolivina* of the gathering, frequent, well-developed, and exhibiting a considerable range in the extent of the surface-markings.

104. *BOLIVINA PLICATA* *d'Orbigny*.

Bolivina plicata d'Orbigny, 1839, FAM. p. 62, pl. 8. figs. 4-7.

„ „ Goës, 1894, ASF. p. 51, pl. 9. figs. 487, 488.

Two specimens, very strongly marked.

105. *BOLIVINA INFLATA* *Heron-Allen & Earland*.

Bolivina inflata Heron-Allen & Earland, 1913, CI. p. 68, pl. 4. figs. 16-19;
1916, F.W.S. p. 240.

Not uncommon and quite typical.

Sub-family CASSIDULININÆ.

CASSIDULINA *d'Orbigny*.106. CASSIDULINA CRASSA *d'Orbigny*.

Cassidulina crassa d'Orbigny, 1839, FAM. p. 56, pl. 7. figs. 18-20.

Cassidulina crassa Brady, 1884, FC. p. 429, pl. 54. figs. 4, 5.

„ „ Cushman, 1910, etc., FNP. 1911, p. 97, fig. 151.

Rare and very small.

107. CASSIDULINA SUBGLOBOSA *Brady*.

Cassidulina subglobosa Brady, 1884, FC. p. 430, pl. 54. fig. 17.

„ „ Cushman, 1910, etc., FNP, 1911, p. 98, fig. 152.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 652.

Frequent, occurring in two distinct forms, one very small and hyaline, the other much larger (up to three times the size) and with a matt surface. The second form presents the same external characteristics even in the immature condition, and we are unable to offer any explanation of this condition. They are not dead or eroded shells.

108. CASSIDULINA (ORTHOPECTA) CLAVATA *Brady*.

Cassidulina (Orthoplecta) clavata Brady, 1884, FC. p. 432, pl. 113. fig. 9.

„ „ „ Chapman, 1901, FFA. (1902) p. 402 (list),
no. 114.

„ „ „ Heron-Allen & Earland, 1914-15, FKA.
p. 654, pl. 50. figs. 21, 22.

One small specimen of this very rare shallow-water tropical type.

EHRENBERGINA *Reuss*.

109. EHRENBERGINA SERRATA *Reuss*.

Ehrenbergina serrata Reuss, 1849-50, FOT. p. 377, pl. 48. fig. 7.

„ „ Cushman, 1910, etc., FNP. 1911, p. 101, fig. 155.

„ „ Heron-Allen & Earland, 1922, TN. p. 140.

Rare. The specimens are small, with extremely pronounced, raised, limbate sutures. Immature specimens are hardly distinguishable from the figure of *Cassidulina elegans* Sidebottom (S. 1910, J. Quekett Micr. Cl. ser. 2, vol. xi. p. 106, pl. 4. fig. 1), to which, perhaps, we should have ascribed them in the absence of the mature and more typical individuals.

Family LAGENIDÆ.

Sub-family LAGENINÆ.

LAGENA *Walker & Boys*.

110. LAGENA LINEATA (*Williamson*).

Entosolenia lineata Williamson, 1848, BSGL. p. 18, pl. 2. fig. 18.

Lagena „ Brady, 1884, FC. p. 461, pl. 57. fig. 13.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 656.

One typical specimen.

111. *LAGENA SQUAMOSA* (*Montagu*).

Vermiculum squamosum Montagu, 1803, TB. p. 526, pl. 14. fig. 2.

Lagena squamosa Cushman, 1910, etc., FNP. 1913, p. 16, pl. 6. fig. 1.

“ “ Heron-Allen & Earland, 1922, TN. p. 151, pl. vi. figs. 1, 2.

One abnormal, thick-shelled, and weakly marked individual.

112. *LAGENA LÆVIS* (*Montagu*).

Vermiculum læve Montagu, 1803, TB. p. 524.

Lagena lævis Williamson, 1848, BSGL. p. 12, pl. 1. figs. 1, 2.

“ “ Brady, 1884, FC. p. 455, pl. 56. figs. 7-14, 30.

One abnormal specimen, the aboral half of which is very irregularly formed.

113. *LAGENA LÆVIGATA* (*Reuss*).

Fissurina lævigata Reuss, 1849-50, FOT. p. 366, pl. 1. (46) fig. 1.

Lagena “ Brady, 1884, FC. p. 473, pl. 114. fig. 8.

“ “ Heron-Allen & Earland, 1914-15, FKA. p. 661.

One specimen with a hooded aperture resembling Sidebottom's fig. 7 on pl. 17 (S. 1912, LSP. p. 400), which he considers to be allied to *L. millettii* Chaster (C. 1892, FS. p. 61, pl. 1. fig. 10). The Lord Howe specimen has a normal aboral base. A good many small specimens also of the typical form.

114. *LAGENA ANNECTENS* *Burrows & Holland*.

Lagena annectens Burrows & Holland, in J., P., & B. 1866, etc., MFC. 1895, p. 203, pl. 7. fig. 11.

“ “ Heron-Allen & Earland, 1922, TN. p. 155.

One small weak specimen.

115. *LAGENA MARGINATA* (*Walker & Boys*).

Serpula (Lagena) marginata Walker & Boys, 1784, TMR. p. 2, pl. 1. fig. 7.

Lagena marginata Brady, 1884, FC. p. 476, pl. 59. figs. 21-23.

“ “ Heron-Allen & Earland, 1914-15, FKA. p. 663.

Many small fully marginated specimens.

116. *LAGENA BICARINATA* (*Terquem*).

Fissurina bicarinata Terquem, 1882, FEP. p. 31, pl. 1. (9) fig. 24.

Lagena “ Millett, 1895, etc., FM. 1901, p. 624, pl. 14. fig. 13.

“ “ Heron-Allen & Earland, 1914-15, FKA. p. 665.

One minute specimen.

117. *LAGENA CLATHRATA* *Brady*.

Lagena clathrata Brady, 1884, FC. p. 485, pl. 60. fig. 4.

“ “ Heron-Allen & Earland, 1913, Cl. p. 90, pl. 7. fig. 10.

One very feebly costate specimen.

Sub-family NODOSARINÆ.

FRONDICULARIA *Defrance.*

118. FRONDICULARIA SCOTTII *Heron-Allen & Earland.* (Pl. 36. figs. 28, 29.)
Frondicularia scottii Heron-Allen & Earland, 1922, TN. p. 175, pl. 6.
 figs. 30-32.

One small and feeble example which we have no hesitation in ascribing to this species. It lacks the longitudinal grooves and decorations of the type, but it has the same truncate edges and thick shell-wall, which obscures the internal structure. This is brought out by wetting the specimen. The occurrence of this individual in a shore sand is very noteworthy; it is practically identical in size with the pauperate specimen from Raine Island, recorded by us *ut supra*, but is even weaker, having no limbation of the sutural lines. We figure both the Lord Howe and Raine Island specimens.

CRISTELLARIA *Lamarck.*

119. CRISTELLARIA ROTULATA (*Lamarck.*)
Lenticulites rotulata Lamarck, 1804, AM. p. 188, no. 3; 1830, EM. p. 330,
 pl. 466. fig. 5.
Cristellaria „ Brady, 1884, FC. p. 547, pl. 49. fig. 13.
 „ „ Heron-Allen & Earland, 1914-15, FKA. p. 671.
 Rare and rather small, but typical.

120. CRISTELLARIA GIBBA *d'Orbigny.*
Cristellaria gibba, d'Orbigny, 1839, FC. p. 40, pl. 7. figs. 20, 21.
 „ „ Brady, 1884, FC. p. 546, pl. 69. figs. 8, 9.
 „ „ Cushman, 1910, etc., FNP. 1913, p. 69, pl. 35. fig. 1.
 One weak specimen.

Sub-family POLYMORPHININÆ.

POLYMORPHINA *d'Orbigny.*

121. POLYMORPHINA COMMUNIS *d'Orbigny.*
Polymorphina (Guttulina) communis d'Orbigny, 1826, TMC. p. 266,
 nos. 14, 15, pl. 12. figs. 1-4; Modèles, nos. 61, 62.
 „ *communis* Brady, 1884, FC. p. 568, pl. 72. fig. 19.
 „ „ Heron-Allen & Earland, 1914-15, FKA. p. 673.
 A single small specimen.

122. POLYMORPHINA PROBLEMA *d'Orbigny.*
Polymorphina (Guttulina) problema d'Orbigny, 1826, TMC. p. 266, no. 14;
 Modèle, no. 61.

Polymorphina problema Brady, 1884, FC. p. 568, pl. 72. fig. 20; pl. 73, fig. 1.

" " Heron-Allen & Earland, 1922, TN. p. 182.

A single small specimen.

123. POLYMORPHINA REGINA *Brady, Parker, & Jones.*

Polymorphina regina Brady, Parker, & Jones, 1870, GP. p. 241, pl. 41. fig. 32.

" " Brady, 1884, FC. p. 571, pl. 73. figs. 11-13.

" " Cushman, 1910, etc., FNP. 1913, p. 91, pl. 41. figs. 6, 7.

One very large broken specimen and one of normal size.

UVIGERINA *d'Orbigny.*

124. UVIGERINA PYGMÆA *d'Orbigny.*

Uvigerina pygmæa d'Orbigny, 1826, TMC. p. 269, pl. 12. figs. 8, 9; Modèle, no. 67.

" " Brady, 1884, FC. p. 575, pl. 74. figs. 11, 12.

" " Heron-Allen & Earland, 1914-15, FKA. p. 675.

Three rather small specimens with very strong costation.

125. UVIGERINA PORRECTA *Brady.*

Uvigerina porrecta Brady, 1879, etc., RRC. 1879, p. 274, pl. 8. figs. 15, 16.

" " Brady, 1884, FC. p. 577, pl. 74. figs. 21-23.

" " Heron-Allen & Earland, 1914-15, FKA. p. 675.

Frequent and typical.

126. UVIGERINA SELSEYENSIS *Heron-Allen & Earland.*

Uvigerina selseyensis Heron-Allen & Earland, 1908, etc., SB. 1909, p. 437, pl. 18. figs. 1-3.

" " Cushman, 1910, etc., FNP. 1913, p. 93, pl. 42. fig. 5.

Several specimens resembling the Eocene fossils recorded by us (*ut supra*), in the shape and arrangement of the chambers, but with a rough, feebly hispid or striate surface.

127. UVIGERINA ANGULOSA *Williamson.*

Uvigerina angulosa Williamson, 1858, RFGB. p. 67, pl. 5. fig. 140.

" " Brady, 1884, FC. p. 576, pl. 74. figs. 15-18.

" " Heron-Allen & Earland, 1914-15, FKA. p. 676.

Frequent and large. Two separate forms occur, one very long, the other short and rapidly increasing in breadth.

SAGRINA *Parker & Jones.*

128. SAGRINA COLUMELLARIS *Brady.*

Sagrina columellaris Brady, 1884, FC. p. 581, pl. 75. figs. 15-17.

" " Cushman, 1910, etc., FNP. 1913, p. 104, pl. 47. figs. 2, 3.

" " Heron-Allen & Earland, 1914-15, FKA. p. 676.

Rare, but typical.

129. *SAGRINA RAPHANUS* Parker & Jones.

Uvigerina (Sagrina) raphanus Parker & Jones, 1865, NAAF. p. 364, pl. 18.
figs. 16, 17.

Sagrina raphanus Brady, 1884, FC. p. 585, pl. 75. figs. 21-24.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 677.

Rare, large, of the entosolenian type.

Sub-family RAMULININÆ.

RAMULINA *Rupert Jones.*130. *RAMULINA GRIMALDII* Schlumberger. (Pl. 36. fig. 32.)

Ramulina grimaldii Schlumberger, 1891, Mém. Soc. Zool. France, vol. iv.
pp. 509-511, pl. 5.

Ramulina? Heron-Allen & Earland, 1922, TN. p. 187, text-fig.

The occurrence in this material of a specimen practically identical in formation with the one recorded by us (*ut supra*) from New Zealand seems to render it necessary to give it a specific name, a task which we have hitherto avoided. Rather than make a new species on such insufficient material, we have decided to use Schlumberger's name. The organism described and figured by Flint as *R. proteiformis* (F. 1899, RFA. p. 321, pl. 68. fig. 7) appears to be a simpler form of the same kind and possibly identical with Schlumberger's species.

Family GLOBIGERINIDÆ.

GLOBIGERINA *d'Orbigny.*131. *GLOBIGERINA BULLOIDES* *d'Orbigny.*

Globigerina bulloides d'Orbigny, 1826, TMC. p. 277, no. 1; Modèles, nos. 17, 76.

„ „ Brady, 1884, FC. p. 593, pls. 77 & 79. figs. 3-7.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 678.

The specimens are small and few in number.

132. *GLOBIGERINA TRILOBA* Reuss.

Globigerina triloba Reuss, 1849-50, FOT. p. 374, pl. 2. (47) fig. 11.

„ „ Brady, 1884, FC. p. 595, pl. 79. figs. 1, 2; pl. 81. figs. 2, 3.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 678.

More frequent, larger, and better developed than *G. bulloides*.

133. *GLOBIGERINA CRETACEA*, var. *EGGERI* *Heron-Allen & Earland.*

Globigerina cretacea, var. *eggeri* Heron-Allen & Earland, 1922, TN. p. 188,
pl. 7. figs. 6-8.

Two small but typical individuals.

134. *GLOBIGERINA RUBRA* d'Orbigny.*Globigerina rubra* d'Orbigny, 1839, FC. p. 82, pl. 4. figs. 12-14.

" " Brady, 1884, FC. p. 602, pl. 79. figs. 11-16.

" " Heron-Allen & Earland, 1914-15, FKA. p. 679.

Large and not infrequent, but devoid of the characteristic colouring.

Family ROTALIIDÆ.

Subfamily SPIRILLININÆ.

SPIRILLINA *Ehrenberg.*135. SPIRILLINA VIVIPARA *Ehrenberg.**Spirillina vivipara* Ehrenberg, 1841, SNA. p. 442, pl. 3. fig. 41.

" " Brady, 1884, FC. p. 630, pl. 85. figs. 1-5.

" " Heron-Allen & Earland, 1914-15, FKA. p. 683, pl. 51.
figs. 19-23.

Frequent, and presenting the usual wide range of breadth of tube and number of convolutions.

136. SPIRILLINA LIMBATA *Brady.**Spirillina limbata* Brady, 1879, RRC. p. 278, pl. 8. fig. 26.

" " Heron-Allen & Earland, 1914-15, FKA. p. 684.

Rare and not large, but otherwise characteristic.

137. SPIRILLINA DECORATA *Brady.**Spirillina decorata* Brady, 1884, FC. p. 633, pl. 85. figs. 22-25.

" " Heron-Allen & Earland, 1914-15, FKA. p. 685.

Very rare and small.

138. SPIRILLINA DECORATA, var. UNILATERA *Chapman.**Spirillina decorata*, var. *unilatera* Chapman, 1901, etc., FFA. 1902, p. 410,
pl. 36. fig. 17.

A single specimen, exactly resembling Chapman's figure.

139. SPIRILLINA CAMPANULA, sp. nov. (Pl. 36. figs. 33-41.)

Test minute, thin-walled, free or sessile, campanulate or bell-shaped, but more or less laterally compressed, the apex of the bell obtusely rounded. The exterior surface of the test, viewed as an opaque object, is dull, and the sutural lines are flush and only visible as internal markings. Viewed as a transparent object under a high power, the surface is slightly rough or scaly, and the interior of the bell is filled almost to the rim with an unseptate tube, which, starting from a rather large proloculum occupying the apex of the bell, is coiled in 3-5 convolutions round a solid central axis or *columella*. Viewed from the base of the bell, the umbilicus is solid, smooth, and rather

deeply depressed, showing no sign of coiling or of an oral aperture. As in *Spirillina lucida* Sidebottom, the oral extremity of the tube is compressed and sealed into the outer wall of the test. The protoplasmic body, which is dark yellow in colour and full of minute granules of darker tint, is voluminous and occupies the whole of the convolutions.

Spirillina campanula is interesting as presenting an entirely novel plan of growth. The genus is normally a plano-spirally coiled tube, but in most of the species a certain degree of asymmetry is observable between the two faces of the spire, one being raised and the other depressed. This tendency is particularly noticeable in *S. revertens* Rhumbler and *S. lucida* Sidebottom, and is still more pronounced in *S. groomii* Chapman, but none of these can compare with the extraordinary convexity of *S. campanula*.

The species is probably abundant at Lord Howe Island, as many specimens were found in spite of the very small quantity of fine material available for examination. All the specimens were free except one, which was sessile on a fragment of coralline. The perfect manner in which the rim of the bell with its excised edges adapted itself to the shape of the host suggests that such a sessile habitat may be normal, at any rate, up to a stage in the existence of the organism. Such conditions would account for the peculiar form of the rim and the varying degree of compression of the bell. But a careful search of the small quantity of coralline available did not provide further specimens.

One large individual has lost all internal septa by absorption, and the entire cavity of the bell is packed with young individuals, each consisting of a proloculum encircled by a complete coil of tube. At least ten individuals can be counted in the cavity.

The size and relative proportions are very variable. Five specimens measured for height and maximum breadth gave the following measurements:—

Height	·15	·075	·15	·095	·115 mm.
Breadth	·187	·125	·162	·125	·125 mm.

Four others measured gave:—

Maximum breadth.....	·135	·1	·11	·095 mm.
Thickness at rim	·107	·08	·087	·08 mm.

Sub-family ROTALIINÆ.

PATELLINA *Williamson*.

140. PATELLINA CORRUGATA *Williamson*.

Patellina corrugata Williamson, 1858, RFGB. p. 46, pl. 3. figs. 86-89.

„ „ Brady, 1884, FC. p. 634, pl. 86. figs. 1-7.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 687.

Common and typical. All of the rather low-domed, scaly type.

CYMBALOPORA *Hagenow*.141. CYMBALOPORA POEYI (*d'Orbigny*).

Rosalina poeyi d'Orbigny, 1839, FC. p. 92, pl. 3. figs. 18–20. *Rotalia squamosa*, p. 91, pl. 3. figs. 12–14.

Cymbalopora poeyi Brady, 1884, FC. p. 636, pl. 102. fig. 13.

„ „ Heron-Allen & Earland, 1914–15, FKA, p. 687.

One small and weak, and one large and typical specimen.

142. CYMBALOPORA MILLETTII *Heron-Allen & Earland*.

Cymbalopora bulloides Millett, 1898, etc., FM. 1903, p. 697, pl. 7. fig. 4.

„ *millettii* Heron-Allen & Earland, 1915, FKA. p. 689, pl. 51. figs. 32–35.

„ „ Heron-Allen, 1915, RPF. p. 253, pl. 16. fig. 36 ; pl. 17. figs. 46–48, 50, 51.

One perfect specimen with the characteristically marked balloon, and a number of specimens of the apical rotaline mass of chambers.

DISCORBINA *Parker & Jones*.143. DISCORBINA CORA (*d'Orbigny*).

Rosalina cora d'Orbigny, 1839, FAM. p. 45, pl. 6. figs. 19–21.

„ „ Heron-Allen & Earland, 1915, FKA. p. 690 ; 1922, FGA. p. 133, pl. 1 (numbered 2). figs. 33–35.

Fairly typical examples of this very primitive form of *D. globularis* occur, but they are rare.

144. DISCORBINA NITIDA (*Williamson*).

Rotalina nitida Williamson, 1858, RFGB. p. 54, pl. 4. figs. 106–108.

Rotalia „ Brady, 1884, FC. p. 627.

Discorbina „ Heron-Allen & Earland, 1914–15, FKA. p. 691.

Very rare, minute and weak.

145. DISCORBINA CONCINNA *Brady*.

Discorbina concinna Brady, 1884, FC. p. 646, pl. 90. figs. 7, 8.

„ „ Egger, 1893, FG. p. 388, pl. 15. figs. 22–24.

„ „ Heron-Allen & Earland, 1914–15, FKA. p. 691.

Frequent and typical.

146. DISCORBINA ISABELLEANA (*d'Orbigny*).

Rosalina isabelleana d'Orbigny, 1839, FAM. p. 43, pl. 6. figs. 10–12.

Discorbina „ Brady, 1884, FC. p. 646, pl. 88. fig. 1.

„ „ Heron-Allen & Earland, 1914–15, FKA. p. 692.

Frequent. The specimens are good, but small.

147. DISCORBINA VILARDEBOANA (*d'Orbigny*).*Rosalina vilardeboana* d'Orbigny, 1839, FAM. p. 44, pl. 6. figs. 13-15.

" " Brady, 1884, FC. p. 645, pl. 86. fig. 12; pl. 88. fig. 2.

" " Heron-Allen & Earland, 1914-15, FKA. p. 692.

Frequent and generally small, but some of the specimens attained very large size.

148. DISCORBINA ROSACEA (*d'Orbigny*).*Rotalina rosacea* d'Orbigny, 1826, TMC. p. 273, no. 15; Modèle, no. 39.*Discorbina* " Brady, 1884, FC. p. 644, pl. 87. figs. 1, 4.

" " Heron-Allen & Earland, 1914-15, FKA. p. 692.

Frequent and typical.

149. DISCORBINA BACCATA *Heron-Allen & Earland*.*Discorbina baccata* Heron-Allen & Earland, 1913, CI. p. 124, pl. 12. figs. 1-3; 1922, TN. p. 200.

A single small but typical specimen.

150. DISCORBINA TURBO (*d'Orbigny*).*Rotalia (Trochulina) turbo* d'Orbigny, 1826, TMC. p. 274, no. 39; Modèle, no. 73.*Discorbina turbo* Brady, 1884, FC. p. 642, pl. 87. fig. 8.

" " Heron-Allen & Earland, 1914-15, FKA. p. 693.

A single small specimen.

151. DISCORBINA MEDITERRANENSIS (*d'Orbigny*).*Rosalina mediterraneensis* d'Orbigny, 1826, TMC. p. 271, no. 2.*Discorbina* " Heron-Allen & Earland, 1913, CI. p. 118, pl. 9. figs. 12-14, pl. 10. fig. 1; 1914-15, FKA. p. 693.

Common and very typical.

152. DISCORBINA GLOBULARIS (*d'Orbigny*).*Rosalina globularis* d'Orbigny, 1826, TMC. p. 271, no. 1, pl. 13. figs. 1-4; Modèle, no. 69.*Discorbina* " Brady, 1884, FC. p. 643, pl. 86. figs. 8, 13.

" " Heron-Allen & Earland, 1914-15, FKA. p. 694, pl. 51. figs. 36-39.

Very common, presenting every range of variation from depressed forms hardly separable from *D. cora* to highly inflated specimens separable only from *D. valvulata* by the absence of limbation.

153. DISCORBINA ARAUCANA (*d'Orbigny*).*Rosalina araucana* d'Orbigny, 1839, FAM. p. 44, pl. 6. figs. 16-18.*Discorbina araucana* Brady, 1884, FC. p. 645, pl. 86. figs. 10, 11.

" " Heron-Allen & Earland, 1914-15, FKA. p. 695.

Common and fairly typical, varying considerably in size.

154. *DISCORBINA VALVULATA* (*d'Orbigny*).

Rosalina valvulata d'Orbigny, 1826, TMC. p. 271, no. 4; 1836, FIC. p. 136, pl. 2. figs. 19-21.

Discorbina ,, Brady, 1884, FC. p. 644, pl. 87. figs. 5-7.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 695.

Common. Very fine and typical specimens.

155. *DISCORBINA RENIFORMIS* *Heron-Allen & Earland*.

Discorbina reniformis Heron-Allen & Earland, 1914-15, FKA. p. 698, pl. 52. figs. 7-14.

A single quite characteristic specimen of this very obscure species. It appears to be very widely distributed over the Indo-Pacific area, though it is always rare.

156. *DISCORBINA RUGOSA* (*d'Orbigny*).

Rosalina rugosa d'Orbigny, 1839, FAM. p. 42, pl. 2. figs. 12-14.

Discorbina ,, Brady, 1884, FC. p. 652, pl. 87. fig. 3; pl. 91. fig. 4.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 197.

Rare, but very fine and typical specimens.

157. *DISCORBINA POLYSTOMELLOIDES* *Parker & Jones*.

Discorbina polystomelloides Parker & Jones, 1865, NAAF. p. 421, pl. 19. fig. 8.

,, ,, Brady, 1884, FC. p. 652, pl. 91. fig. 1.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 698, pl. 52. figs. 19-23.

Common and attaining comparatively enormous dimensions, the largest having a maximum diameter of 3 mm. The specimens vary considerably in their surface ornament, some having developed secondary shell-structure in the form of beads and ribs to an extent that we have never previously observed in this species.

158. *DISCORBINA RIMOSA* *Parker & Jones*.

Discorbina rimosa Carpenter, Parker, & Jones, 1862, ISF. p. 205.

,, ,, Millett, 1898, etc., FM. 1903, p. 702, pl. 7. fig. 7.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 700.

The specimens referable to this species merely tend to confirm our views expressed (*ut supra*) as to the inexpediency of separating this species from *D. polystomelloides*. They could very well be included as pauperate specimens of the latter, in view of the wide range of variation exhibited by that species.

159. *DISCORBINA RARESCENS* *Brady*.

Discorbina rarescens Brady, 1884, FC. p. 651, pl. 90. figs. 2, 3, & ? 4.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 700.

One small but perfectly typical specimen.

160. *DISCORBINA PULVINATA* Brady. (Pl. 36. figs. 42-46.)

Discorbina pulvinata Brady, 1884, FC. p. 650, pl. 88. figs. 10, a, b.

„ „ Sidebottom, 1904, etc., RFD. 1908, p. 14, pl. 5. fig. 4.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 703.

Frequent, and the specimens vary between relatively smooth and highly corrugate on the superior face. Nearly all of them exhibit "budding" in various stages, from a single minute primordial chamber in the umbilicus of the oral side to specimens in which the base and internal septa have disappeared by absorption. Two individuals with young brood clustered round the orifice were observed, which we figure.

161. *DISCORBINA PATELLIFORMIS* Brady.

Discorbina patelliformis Brady, 1884, FC. p. 647, pl. 88. fig. 3; pl. 89. fig. 4.

„ „ Sidebottom, 1904, etc., RFD. 1908, p. 14, pl. 5. fig. 3.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 703, pl. 52. fig. 32.

Very common and attaining a large size. The specimens are perfectly preserved and very handsome. One "budding" pair of small individuals was observed.

162. *DISCORBINA HARMERI* Heron-Allen & Earland.

Discorbina harmeri Heron-Allen & Earland, 1922, TN. p. 204, pl. 7. figs. 9-11.

One minute but typical specimen. It is interesting to note the occurrence of this recently described species in a new area, though it is evidently not firmly established there.

163. *DISCORBINA TABERNACULARIS* Brady. (Pl. 36. figs. 47-49.)

Discorbina tabernacularis Brady, 1884, FC. p. 648, pl. 89. figs. 5-7.

„ „ Heron-Allen & Earland, 1914-15, FKA, p. 704.

Common and quite typical. Many "budding" and associated pairs; also individuals with the base and septa eroded. A specimen of the latter where the internal cavity was filled with young individuals (fig. 49).

164. *DISCORBINA LAURIEL*, nom. nov. (Pl. 36. figs. 50-52; Pl. 37. figs. 53-55.)

Discorbina tabernacularis Sidebottom, 1910, RFBP. p. 25, pl. 3. fig. 12.

The little test figured by Sidebottom though doubtless allied to *D. tabernacularis* cannot be taxonomically referred to that species. It has many points of distinction: the paucity of chambers, which rarely exceed two convolutions of five chambers each; its blunted, or rounded, apex, with a prominent primordial chamber; its greatly inferior but constant size; and perhaps, most of all, its constant habit of "budding" pairs. Specimens which do not present this feature are so uncommon as to be noticeable. It

is moderately common in the material, as it is, indeed, in shallow-water gatherings from most tropical and temperate seas. Liebus and Schubert's variety, *D. tabernacularis*, var. *levis* (Jahrb. k.-k. geol. Reichsanst. 1902, vol. lii. p. 301, fig. 5), has many points of resemblance, but differs in the absence of the characteristic radial beading which decorates the base of *D. lauriei*, as it does the base of *D. tabernacularis*.

165. DISCORBINA PYRAMIDALIS, sp. nov. (Pl. 37. figs. 56-61.)

Test free, shaped like a four-sided pyramid with slightly excavated sides, and salient angles, consisting of 3-5 convolutions, each of four chambers, the widest portion of each chamber being at the angle, and the sutural divisions running down the middle of each side. Shell-wall thick; the base excavate, studded with beads, arranged radially, with the aperture of the final chamber in the umbilical recess. In all the specimens examined in balsam the primordial chamber is large and spherical, occupying as much as a quarter of the pointed apex of the pyramid.

Several "twinned" pairs occur. The specimens are usually about the same size. There is a considerable range both in size and height of the free individuals; in fact, there appear to be two fairly distinctive forms, one small and more or less regularly pyramidal (*i. e.*, the height being roughly equal to the diameter of the base), the other with a height double that diameter. These may represent the megalos- and microspheric stages of the organism. Among other variations noticeable are (1) a single three-sided specimen, (2) several specimens in which the angular edges of the pyramid are curving lines, so that, when viewed from the top, a spiral structure is suggested. The shell is thick and free from surface ornamentation.

This species is evidently closely allied to Millett's *D. corrugata* (M. 1898, etc., FM. 1903, p. 700, pl. 7. fig. 5). We have good examples of this, from the Arakan coast of Burma. Millett's original types, which are in our possession, bear, in his handwriting, as locality "Sagami Bay, Japan." Millett's form has five salient angles and a much less polished exterior than *D. pyramidalis*. We have typical specimens of *D. pyramidalis* from Suva, Fiji Is. (12 fms., very rare), and we have noted its occurrence at 'Challenger' Station 185, "Raine Id." (155 fms., also very rare), so that we may assume that the form is widely distributed in the tropical Pacific. It is of constant occurrence in a series of shore-sands which we possess from St. Vincent's Gulf and Spencer Gulf (S. Australia), and it also occurs in two shore-sands from W. Australia (Fremantle and Rottnest Island). The lack of suitable material from the remaining shores of Australia renders the records incomplete, but it appears highly probable that the species will be found to be a typical form in Australian shore-gatherings.

Size. Basal diameter at edges .08-.16 mm. (small type) to .28 mm. (large type). Height .05-.21 mm. (small type) to .35 mm. (large type).

PLANORBULINA *d'Orbigny*.166. PLANORBULINA MEDITERRANENSIS *d'Orbigny*.

Planorbulina mediterranensis d'Orbigny, 1826, TMC. p. 280, pl. 14. figs. 4-6;
Modèle, no. 79.

„ „ Brady, 1884, FC. p. 656, pl. 92. figs. 1-3.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 705.

A single large specimen.

167. PLANORBULINA LARVATA *Parker & Jones*.

Planorbulina vulgaris, var. *larvata* Parker & Jones, 1859, etc., NF. 1860,
p. 294.

„ *larvata* Brady, 1884, FC. p. 658, pl. 92. figs. 5, 6.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 706.

One somewhat doubtful specimen.

TRUNCATULINA *d'Orbigny*.168. TRUNCATULINA LOBATULA (*Walker & Jacob*).

Nautilus lobatulus Walker & Jacob, 1798, AEM. p. 642, pl. 14. fig. 35.

Truncatulina lobatula Brady, 1884, FC. p. 660, pl. 92. fig. 10 (etc.).

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 706.

Common and presenting the usual range of variation.

169. TRUNCATULINA VARIABILIS *d'Orbigny*.

Truncatulina variabilis d'Orbigny, 1826, TMC. p. 279, no. 8.

„ „ Brady, 1884, FC. p. 661, pl. 93. figs. 6, 7.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 706; 1922,
FGA. p. 137, pl. 1 (numbered 2). figs. 38, 39.

Very common, ranging from normal variations up to the wild-growing Soldanian types.

170. TRUNCATULINA REFULGENS (*Montfort*).

Cibicides refulgens Montfort, 1808-10, CS. vol. i. p. 122, 31^{me} genre.

Truncatulina „ Brady, 1884, FC. p. 659, pl. 92. figs. 7-9

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 707.

Very common and highly typical.

171. TRUNCATULINA UNGERIANA (*d'Orbigny*).

Rotalina ungeriana d'Orbigny, 1846, FFV. p. 157, pl. 8. figs. 16-18.

Truncatulina „ Brady, 1884, FC. p. 664, pl. 94. fig. 9.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 708.

Frequent and well-developed.

172. TRUNCATULINA PRÆCINCTA *Karrer*.

Rotalia præcincta Karrer, 1868, MFKB. p. 189, pl. 5. fig. 7.

Truncatulina ,, Brady, 1884, FC. p. 667, pl. 95. figs. 1-3.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 709.

Very rare, but typical.

PULVINULINA *Parker & Jones*.173. PULVINULINA REPANDA (*Fichtel & Moll*).

Nautilus repandus Fichtel & Moll, 1798, TM. p. 35, pl. 3. figs. a-d.

Pulvinulina repanda Brady, 1884, FC. p. 684, pl. 104. fig. 18.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 713.

Frequent and some of the specimens are large, but nearly all broken or water-worn.

174. PULVINULINA LATERALIS (*Terquem*).

Rosalina lateralis Terquem, 1878, FIR. p. 25, pl. 2. (7) fig. 11.

Pulvinulina ,, Brady, FC. p. 689, pl. 106. figs. 2, 3.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 714, pl. 53.
figs. 6-11.

One large and typical specimen.

175. PULVINULINA CONCENTRICA *Parker & Jones*.

Pulvinulina concentrica Parker, Jones, & Brady, 1864, RFS. p. 470, pl. 48.
fig. 14.

,, ,, Brady, 1844, FC. p. 686, pl. 105. fig. 1.

,, ,, Heron-Allen & Earland, 1914-15, FKA. p. 714.

Small, but frequent and typical.

176. PULVINULINA CANARIENSIS (*d'Orbigny*).

Rotalina canariensis d'Orbigny, 1839, FIC. p. 130, pl. 1. figs. 34-36.

Pulvinulina ,, Brady, 1884, FC. p. 692, pl. 103. figs. 8-9.

,, ,, Cushman, 1921, FP. p. 338, pl. 66. fig. 1.

Rare, but quite typical.

177. PULVINULINA CRASSA (*d'Orbigny*).

Rotalina crassa d'Orbigny, 1840, CBP. p. 32, pl. 3. figs. 7, 8.

Pulvinulina ,, Brady, 1884, FC. p. 694, pl. 103. figs. 11, 12.

,, ,, Cushman, 1921, FP. p. 338, pl. 67. fig. 3.

Frequent and well-developed.

178. PULVINULINA TRUNCATULINOIDES (*d'Orbigny*).

Rotalina truncatulinoides d'Orbigny, 1839, FIC. p. 132, pl. 2. figs. 25-27.

Pulvinulina ,, Heron-Allen & Earland, 1922, TN. p. 216.

Very rare. This is the type with the sunken umbilicus and pronounced sutures as contrasted with the smooth and rounded type *P. micheliniana*. We have gone into this matter on several occasions, and particularly *ut supra*.

179. PULVINULINA ELEGANS (*d'Orbigny*).

Rotalia (Turbinulina) elegans d'Orbigny, 1826, TMC. p. 276, no. 54.

Pulvinulina elegans Brady, 1884, FC. p. 699, pl. 105, figs. 4-6.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 717.

One small and broken specimen.

ROTALIA *Lamarck*.

180. ROTALIA BECCARII (*Linné*).

Nautilus beccarii Linné, 1767, SN. p. 1162; 1788, SN. p. 3370.

Rotalia (Turbinulina) beccarii d'Orbigny, 1826, TMC. p. 275, no. 42; Modèle, no. 74.

„ *beccarii* Brady, 1884, FC. p. 704, pl. 107, figs. 2, 3.

One large but very weak specimen, hardly separable from the next species.

181. ROTALIA PERLUCIDA *Heron-Allen & Earland*.

Rotalia beccarii (pars) Balkwill & Wright, 1885, DIS, p. 351.

„ *perlucida* Heron-Allen & Earland, 1913, CL. p. 139, pl. 13, figs. 7-9; 1914-15, FKA. p. 718.

Not uncommon. Extremely depressed and pauperate.

Sub-family TINOPORINÆ.

GYPSSINA *Carter*.

182. GYPSSINA INHÆRENS (*Schultze*). (Pl. 37. figs. 62-64.)

Acervulina inhaerens Schultze, 1854, OP. p. 68, pl. 6, fig. 12.

Gypsina „ Brady, 1884, FC. p. 718, pl. 102, figs. 1-6.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 724.

Very common, and, as usual, very variable in the size of the chamberlets. One specimen was observed characterized by the extremely small size of the constituent chambers, some of which are broken and disclose tightly packed young individuals within (fig. 62).

Among the noticeable variations are two forms: one, white with very large and loosely aggregated chambers, often extending in acervuline projections, and sometimes fairly smooth and coarsely perforate, at others covered with densely aggregated spines of secondary shell-matter. The shape may possibly be due to the irregular surface of the host from which the specimens have become detached. In another variant, possibly more nearly related to *G. rubra*, the form is wild-growing, large-chambered, the

chambers often running in irregular chains, thick-walled, coarsely perforate, but without exogenous shell-matter, colour inclined to pale red running to dirty white. The final chamber of an extended series is often subglobular in shape and of large size.

The first variety suggests *Holocladina pustulifera* Carter (C. 1880, SGM. p. 447, pl. 18, figs. 4, *a-g*), but lacks the terminal perforation of the spine, upon which Carter lays a stress which appears to us to be superfluous.

183. *GYPSSINA RUBRA* (*d'Orbigny*).

Planorbulina rubra d'Orbigny, 1826, TMC. p. 280, no. 4.

„ „ Fornasini, 1908, SON. p. 44, pl. 2. fig. 3.

Gypsina „ Heron-Allen & Earland, 1914-15, FKA. p. 725, pl. 53. figs. 35-37.

Many large fragments. The exogenous shell-growth is not so abnormally developed as is usually the case in this form.

184. *GYPSSINA VESICULARIS* (*Parker & Jones*).

Orbitolina vesicularis Parker & Jones, 1859, etc., NF. 1860, p. 31, no. 5.

Gypsina „ Brady, 1884, FC. p. 718, pl. 101. figs. 9-12.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 726.

A few large water-worn specimens.

185. *GYPSSINA GLOBULUS* (*Reuss*).

Cerriopora globulus Reuss, 1847, Haidinger's Naturw. Abh. vol. ii. p. 33, pl. 5. fig. 7.

Gypsina „ Brady, 1884, FC. p. 717, pl. 101. fig. 8.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 727.

Large, but infrequent.

BACULOGYPSSINA *Sacco*.

186. *BACULOGYPSSINA SPHÆRULATA* (*Parker & Jones*). (Pl. 37. fig. 65.)

Orbitolina sphaerulata Parker & Jones, 1859, etc., NF. 1860, p. 33.

Tinoporus baculatus Carpenter, 1856, etc., RF. 1860, p. 564, pl. 18, figs. 2-6.

„ „ Brady, 1884, FC. p. 716, pl. 101. figs. 4-7.

Baculogypsina baculata Silvestri, 1905, B. p. 69, fig. 2.

„ *sphaerulatus* Cushman, 1921, FP. p. 359, pl. 75. fig. 6.

Extremely abundant; attaining large dimensions and exhibiting great variety in the number, arrangement, and development of the spines or lobose processes. These frequently have a furcate appearance, but minute examination shows that this appearance is due to the close proximity of separate processes. Some of the specimens are almost spherical, and in these, as a rule, the processes are short and inconspicuous, though often occurring in greater numbers than usual, and occasionally concentrated into closely

juxtaposed groups. The finer material provided an abundant supply of immature specimens, which when mounted in balsam exhibited a large primordial chamber with chitinous lining, followed by a single coil of about twelve globular chambers of gradually increasing size, in one plane. The chambers in the convolution are separated by dense, solid shell-substance. On completion of rather more than a single convolution, the chambers become less spherical and are irregularly heaped over their predecessors as in *Gypsina*. The spinous processes, perforated by secondary canals, are seen to originate from a solid layer of shell-substance on the outer wall of the primary coil. The general colour of the specimen is much less conspicuous than in most "Tinoporus gatherings" which have been examined. The species generally gives a yellowish-orange tint to the sands in which it is predominant, but the Lord Howe specimens are nearly white.

The complicated synonymy of this organism is fully discussed in the papers quoted above, and in others referred to in those papers.

POLYTREMA *Risso*.

187. POLYTREMA MINIACEUM (*Pallas*).

Millepora miniacea Pallas, 1766, Elenchus Zoophytorum, p. 251.

Polytrema miniaceum Brady, 1884, FC. p. 721, pl. 100, figs. 5-9; pl. 101, fig. 1.

" " Heron-Allen & Earland, 1922, TN. p. 221, pl. 8; 1922, FGA. p. 139, pl. 2 (numbered 1).

Curiously rare. The specimens call for no particular comment. A few specimens of the free early stage were observed.

188. POLYTREMA MINIACEUM, var. ALBA *Carter*.

Polytrema miniaceum, var. *album* Carter, 1877, CB. p. 213, pl. 13, figs. 14, 15.

" " " *alba* Brady, 1884, FC. p. 721, pl. 101, figs. 2, 3.

" " " " Heron-Allen & Earland, 1922, TN. 226.

As usual, rarer than the type, but unmistakable.

Family NUMMULINIDÆ.

Sub-family POLYSTOMELLINÆ.

NONIONINA *d'Orbigny*.

189. NONIONINA DEPRESSULA (*Walker & Jacob*).

Nautilus depressulus Walker & Jacob, 1798, AEM. p. 641, pl. 14, fig. 33.

Nonionina depressula Brady, 1884, FC. p. 725, pl. 109, figs. 6, 7.

" " Heron-Allen & Earland, 1914-15, FKA. p. 730.

Very rare and minute.

190. *NONIONINA UMBILICATULA* (*Montagu*).
Nautilus umbilicatus Montagu, 1803, TB. p. 191; Suppl. p. 78, pl. 18.
 fig. 1.
Nonionina umbilicata Brady, 1884, FC. p. 726, pl. 109. figs. 8, 9.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 730.
 A single small specimen.
191. *NONIONINA PAUPERATA* *Balkwill & Wright*.
Nonionina pauperata Balkwill & Wright, 1885, DIS. p. 353, pl. 13. figs. 25, 26.
 " " Heron-Allen & Earland, 1908, etc., SB. 1911, p. 342,
 pl. 11. figs. 16, 17; 1914-15, FKA. p. 732.
 Frequent and typical.
- POLYSTOMELLA *Lamarck*.
192. *POLYSTOMELLA STRIATO-PUNCTATA* (*Fichtel & Moll*).
Nautilus striato-punctatus Fichtel & Moll, 1798, TM. p. 61, pl. 9. figs. a-c.
Polystomella striato-punctata Brady, 1884, FC. p. 733, pl. 109. figs. 22, 23.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 733.
 A single small but typical specimen.
193. *POLYSTOMELLA CRISPA* (*Linné*).
Nautilus crispus Linné, 1788, p. 3370, no. 3.
Polystomella crispa Brady, 1884, FC. p. 736, pl. 110. figs. 6, 7.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 733.
 Not uncommon, but small and weakly developed.
194. *POLYSTOMELLA MACELLA* (*Fichtel & Moll*).
Nautilus macellus Fichtel & Moll, 1798. TM. p. 66, pl. 10. figs. e-g.
Polystomella macella Brady, 1884, FC. p. 737, pl. 110. figs. 8, 9, 11.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 734.
 Frequent and typical.
195. *POLYSTOMELLA MILLETTI* *Heron-Allen & Earland*.
 ? *Polystomella verriculata* Millett, 1898, etc., FM. 1904, p. 604, pl. 11. fig. 3.
 " *milletti* Heron-Allen & Earland, 1914-15, FKA. p. 735, pl. 53.
 figs. 38-42.
 A single small and starved but unmistakable specimen.

Sub-family NUMMULITINÆ.

AMPHISTEGINA *d'Orbigny*.

196. *AMPHISTEGINA LESSONII d'Orbigny*.
Amphistegina lessonii d'Orbigny, 1826, TMC. p. 304, no. 3, pl. 17. figs. 1-4;
 Modèle, no. 98.
 " " Brady, 1884, FC. p. 740, pl. 111. figs. 1-7.
 " " Heron-Allen & Earland, 1914-15, FKA. p. 736.

Common, and presenting all the usual modifications of biconvexity. The specimens are for the most part strongly developed. No specimens of the tuberculate varieties, so abundant in some tropical gatherings, were seen.

197. AMPHISTEGINA LESSONII, var. GIBBA *d'Orbigny*.

Amphistegina gibba d'Orbigny, 1826, TMC. p. 304, no. 6.

„ *mamillata* d'Orbigny, 1846, FFV. p. 208, pl. 12, figs. 6-8.

„ *lessonii*, var. *gibba* Heron-Allen & Earland, 1914-15, FKA. p. 737.

This variety is fairly frequent and typical. It is characterized by its marked plano-convexity.

OPERCULINA *d'Orbigny*.

198. OPERCULINA COMPLANATA (*DeFrance*).

Lenticulites complanata DeFrance, 1822, Dict. Sci. Nat. vol. xxv. p. 453.

Operculina „ d'Orbigny, 1826, TMC. p. 281, no. 1, pl. 4, figs. 7-10; Modèle, no. 80.

„ „ Brady, 1884, FC. p. 743, pl. 112, figs. 3-5, 8.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 737.

Extremely rare; represented by two moderate-sized water-worn specimens and one very minute individual. The rarity of this form is noteworthy.

HETEROSTEGINA *d'Orbigny*.

199. HETEROSTEGINA DEPRESSA *d'Orbigny*.

Heterostegina depressa d'Orbigny, 1826, TMC. p. 305, pl. 17, figs. 5-7; Modèle, no. 99.

„ „ Brady, 1884, FC. p. 746, pl. 112, figs. 14-20.

„ „ Heron-Allen & Earland, 1914-15, FKA. p. 738.

Rare, but large and well-developed.

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* This paper is variously referred to as being dated 1849 and 1850. It was read in May 1849, and all the separate copies were dated on a special title-page 1849, but the volume of which it forms part was issued in 1850, and is so dated.

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EXPLANATION OF THE PLATES.

PLATES 35-37.

- Fig. 1. *Nubecularia lucifuga* DeFrance. Showing young individuals in fractured chamber. $\times 55$.
- 2-5. " *schauinslandi* (Rhumbler). $\times 35$.
- 6-7. *Spiroloculina tenuirostra* Karrer. Fig. 6. Central portion abraded. $\times 145$.
8. *Miliolina auberiana*, var. *semireticulata*, var. nov. Front view. } $\times 55$.
9. " " " " Back view. }
10. " " " " Oral view. }
11. *Craterites rectus*, gen. nov. et sp. nov. Side view, showing the expanding base, layers of chamberlets, and cribrate oral surface. $\times 30$.
12. " " gen. nov. et sp. nov. Superior view of cribrate oral surface, showing similar structure underneath through fractures on surface-layer. $\times 30$.
13. *Diffusilina humilis*, gen. nov. et sp. nov. A perfect specimen attached to Nullipore, showing pustular processes on the surface, which is otherwise un-abraded. $\times 28$.
- 14-16. " " gen. nov. et sp. nov. Specimens showing partially abraded surface, exposing the labyrinthic protoplasmic structure (shown black). $\times 28$.
17. *Haddonina torresiensis* Chapman. Young textularian specimen, showing commencement of wild later growth. $\times 30$.
- 19-20. " " " Fully-developed specimens, showing textularian commencement to wild-growing portion. $\times 30$.
21. " " " Showing the oral extremity. $\times 30$.
- 18 & 22. " " " Specimens incorporating large sand-grains. $\times 30$.
- 23-24. *Bulimina elegantissima* d'Orbigny. Fig. 23. The bud is a single chamber; Fig. 24, developed into a young individual of several chambers. $\times 145$.
- 25-26. *Bolivina limbata*, var. *abbreviata*, nov. Side views. } $\times 145$.
27. " " " " Edge view. }
28. *Fronicularia scottii* Heron-Allen & Earland. Specimen from Lord Howe Island. $\times 145$.
29. " " " " Specimen from 'Challenger' Stn. 185 (Raine Island). $\times 145$.
- 30-31. *Uvigerina selseyensis* Heron-Allen & Earland. $\times 145$.
32. *Ramulina grimaldii* Schlumberger. $\times 26$.
- 33-34. *Spirillina campanula*, sp. nov. Side views. } Viewed as opaque specimens.
35. " " " " Apical view. }
36. " " " " Basal view. }
- 37-38. " " " " Balsam mounts. Side views.
39. " " " " " " Apical view. Scaly surface.
40. " " " " " " Basal view.
41. " " " " " " Specimen in which the septa having been entirely absorbed, the central cavity is filled with a mass of young individuals, which are shown in optical section. All $\times 340$.
42. *Discorbina pulvinata* Brady. Superior view.
- 43-45. " " " " Basal view, showing development of young individuals around oral aperture.

